Undergraduate Research and Artistry Day
Community Engagement Showcase

Holmes Student Center
Wednesday, April 18, 2018
9 a.m. - 2 p.m.
oseel.niu.edu
Welcome to the 9th annual Undergraduate Research and Artistry Day and Community Engagement Showcase! From research on postural control characteristics of dance major students at NIU to community engagement projects focused on the interactive discussion that helps to promote unity through our uniqueness at Conversation Cafe, students have the ability to engage in hands-on meaningful activities that bring to life the world around them.

We believe NIU’s undergraduate research programs like Research Rookies, Undergraduate Special Opportunities in Artistry and Research, Student Engagement Fund, Summer Research Opportunities Program and Community Engagement programs like Huskie Service Scholars and NIU Service Leaders will challenge students to define their passions, academic and professional goals, and ultimately their contributions to society.

Moreover, participating in the breadth of undergraduate research and community engagement opportunities at NIU can have a profound impact on a student’s academic and personal journey. It is our hope that students will explore these exciting programs and begin to realize their full potential while they move toward a degree at Northern Illinois University. Our goal through this event is to provide students with a venue to showcase their academic and community engagement work. We know you will be as impressed with the caliber of NIU’s undergraduate students as we are!

Renique Kersh, Ph.D.
Associate Vice Provost for Engaged Learning
Director, Office of Student Engagement and Experiential Learning
Greetings,

At Northern Illinois University, we strive to provide all of our undergraduate students with opportunities to engage in hands-on learning, both in and out of the classroom, to promote their academic and career success. Undergraduate Research and Artistry Day is a celebration of our students’ original intellectual and creative contributions to their disciplines.

The undergraduate students participating in this event have worked closely with talented members of NIU’s faculty and staff to develop critical thinking skills, to solve complex problems, and to create new knowledge. I am proud of their accomplishments as scholars, scientists, engineers, artists and inventors. I am confident that they will become life-long learners, as well as empowered, informed, responsible citizens.

Thank you for attending our students’ presentations. Explore. Ask questions. Learn. And, please join me in acknowledging the effort and accomplishments of both the students and their mentors. NIU is grateful for your interest and support.

Lisa Freeman and Christopher K. McCord
# Table of Contents

Award Categories ..................................................4  
Judges ..................................................................5  
Event Map ...............................................................6  
Abstracts - Table Talks ...........................................10  
Abstracts – Posters ................................................14  
  College of Business ................................................15  
  College of Education ...........................................18  
College of Engineering and Engineering Technology ..........22  
College of Liberal Arts and Sciences ............................43  
College of Visual and Performing Arts ........................103  
Abstracts - Community Engagement Showcase ............104  
Abstracts – Exhibits ..............................................114  
Abstracts – Sycamore High School ............................120  
Acknowledgements ................................................124
Awards

Prizes are awarded in six categories:

URAD STEM: Science, Technology, Engineering and Mathematics
(presented by the Office of Student Engagement and Experiential Learning)

URAD AEHHSS: Arts, Education, Health, Humanities and Social Sciences
(presented by the Office of Student Engagement and Experiential Learning)

Exhibits (presented by the Office of Student Engagement and Experiential Learning)

Community Engagement Showcase
(presented by the Office of Student Engagement and Experiential Learning)

Humanities Award (presented by the Humanities group of the College of Liberal Arts and Sciences)

URAD PCSOGI (presented by the Presidential Commission on Sexual Orientation & Gender Identity)

Schedule of Events

Viewing of Projects
(Presenters will rotate throughout the event)

URAD Session 1 9:00am - 10:15am
URAD Session 2 10:15am - 11:30am
URAD Session 3 11:30am - 12:45pm
URAD Session 4 12:45pm - 2:00pm

Community Engagement Showcase 12:00pm - 2:00pm
URAD Judges

Beatrix Hoffman; History
Brad Sagarin; Psychology
Brian Berchtold; Institutional Effectiveness
Charles Achilles
Chris Einolf; NGO
Christian Steciuch; Psychology
Christine D'Alexander; School of Music
Colin Kuehl; Political Science and Environmental Studies
Denise R. Hayman; McKinley "Deacon"
Davis CHANCE Program
Dhiman Chakraborty; Physics/NIU
Donald S. Zinger; Electrical Engineering
Taylor Atkins; NIU History
Holly Jones; BIOS/ESE
James Wolter; Biology and/or Education
Jason Hanna; Philosophy
Jeffrey Salmon; Military and Post-Traditional Student Services
Jessica Martinez; Kinesiology and Physical Education
Jill Zambito; Student Involvement and Leadership Development
Jon Miller; Biological Sciences
Katherine Fant; Kinesiology and Physical Education
Kristin Huffine; History Department
Kyu Taek Cho; Mechanical Engineering
Larissa Garcia; University Libraries
Lauren Mock; Study Abroad
Laurence Lurio; Physics
Leanne VandeCreek; University Libraries
Liping Guo; Engineering Technology
Mandy Faretta-Stutenberg; World Languages and Cultures
Masih Shokrani; School of Health Studies
Michael Eads; Department of Physics
Michael Vega; Chemistry and Biochemistry
Mrittika Debnath; Chemistry and Biochemistry
Mujtaba; Engineering Technology
Natalie Low; Psychology
Nestor L. Osorio; University Libraries
Nick Barber; Dept. of Biological Sciences
Nina Mounts; Psychology
Oreoluwa Akinbo; Psychology - NAB
Patty Wallace; Center for the Study of Family Violence & Sexual Assault
Peter Chomentowski; KNPE
Peter Olson; Art Museum
Pi-Sui Hsu; Educational Technology, Research and Assessment
Rodrigo Dominguez-Martinez; Latinx Alumni Council
Roland Winkler; Physics
Sally Yacout; Chemistry and Biochemistry
Scot Schraufnagel; Political Science
Scott Grayburn; Biological Sciences
Scott Mooberry; Environmental Health and Safety Department
Sean Kennedy; Chemistry & Biochemistry
Shanthi Muthuswamy; Technology
Sheila Barrett; Nutrition and Dietetics
Shuqi Zhang; Kinesiology and Physical Education
Steven Daskal; Philosophy
Theodore Hogan; Engineering Technology
Thomas Gilbert; Dept. of Chemistry & Biochemistry
Timothy Hagen; Chemistry
Valerie Garver; History
Vera Lind; Department of History
W. Tang Watanasriyakul; Psychology
Zhili Xiao; Physics

CES Judges

Alicia Schatteman; Center for Nonprofit & NGO Studies/Public Administration
Cathy Doederlein; NIU Career Services
Cody Carter; Alumni Association
Jolene Willis; DeKalb County Community Development Department
Kathy Ladell; University Libraries
Melissa Burlingame; Environmental Studies/Communiversity Gardens/NIU Green Team
Nancy Prange; NIU School of Health Studies
Staci Hoste; Northern Public Radio
Event Map (Gallery Lounge)

1. Glass Gallery Table Talks
2. Presenter Check-In
3. Judges’ Check-In in Regency Room

Undergraduate Research and Artistry Day and Community Engagement Showcase Check-In
Event Map (Duke Ellington Ballroom)
Undergraduate Research and Artistry Day Exhibits

Resource Table

Duke Ellington Ballroom Entrance
Abstracts

*Table Talks*

Please Note: All abstracts are printed as submitted by project participants, and are represented in the college of the student’s project.
Emma Ruiz  
*Student Recruiting; Marketing to the Hispanic Population*

**Author(s):** Emma Ruiz  
**Department:** Marketing  
**Faculty Mentor(s):** Geoffrey Gordon, Emily Cronauer  
**Session Time:** Session 3  
**Table Number:** 2

The primary purpose of the current study is to build upon previous research by exploring the primary influences on Latino student’s colleges decisions. As there is an underrepresentation of Latino students in Northern Illinois University and higher education as a whole, the purpose of this study is to determine the connection between Latino high school student’s influences and how it determines the pragmatic decision of choosing a college to attend. The study will involve current Northern Illinois University college students ranging from incoming freshman to graduating seniors, in which they will be surveyed using a program called “Qualtrics” in order to collect data. The results will be evaluated and then examined to determine the primary factors that are influencing Latino student’s college decisions. In efforts to assist Northern Illinois University in recruiting and marketing to Latinos, the study will allow for the university to increase the enrollment rates and diversity on campus.

Nicholas Bergman  
*What Grasses can teach us about Evolution*

**Author(s):** Nicholas Bergman  
**Department:** Biological Sciences  
**Faculty Mentor(s):** Melvin Duvall  
**Session Time:** Session 3  
**Table Number:** 2

The purpose of this poster is to explain the process by which a completed grass plastome (chloroplast genome) is created. The research will focus on six steps in plastome assembly. De Bruijn graph assembly is used to assemble contigs (contiguous sequences). Anchored conserved region extension orders contigs and locates errors from the assembly. In-silico genome walking is how researchers fill the gaps between contigs. Verification is used to find errors. Final assembly and annotation is when important features of the genome are labeled. After these steps the plastome is completed. Complete plastomes were assembled and compared for 11 species of grasses and several notable differences were found. A gene known as rpoC1 possessed a large intron in only one species. An area known as trnI to trnL gap possesses many different conformations despite the conserved nature of the area. The plastome can then be made publicly available to be used in comparing multiple completed plastomes created in the same way to reveal understandings about how DNA changes between species, genera, and families of organisms.
Nicholas Casas

*Identifying Predictors of Congressional Incivility: An individual-level analysis*

Author(s): Nicholas Casas  
Department: Political Science  
Faculty Mentor(s): Scot Schraufnagel  
Session Time: Session 3  
Table Number: 1

This research explores what background characteristics are more closely associated with uncivil acts by members of Congress, while serving in Congress. Put differently, the research seeks to identify biographical attributes that predict uncivil member behavior. The time period of the study is the 45th (1877-78) through the 113th Congress (2013-14). Each implicated member is compared, randomly, with another member from their political party, their chamber, and their Congress, holding constant these factors as possible explanations for uncivil acts. Independent variables tested include: legal education and experience, judicial experience, state legislature experience, ideological alignment, congressional leadership, being the chair of a standing committee, and gender. The analysis suggests both leadership roles, state legislative experience, and gender associate with civility in the hypothesized manner. However, our test of legal background confirms the null hypothesis; there is no difference between those implicated and their matched pair.

Theodore Agbemaple

*Biorhythm and Biological Clocks*

Author(s): Theodore Agbemaple  
Department: Psychology  
Faculty Mentor(s):  
Session Time: Session 3  
Table Number: 1

A biorhythm is a cyclic behavior pattern that is displayed over a varying length of time. In our neural system, we have structures that produce biorhythmic behavior. These structures are known as biological clocks. From mammals to plants to even bacteria, nearly all organisms display evidence of behavior being orchestrated by an internal biological clock. In humans, the main neural structure responsible for our patterns of behavior is the suprachiasmatic nucleus, a small region of the hypothalamus. It helps entrain our bodies to follow a 24 hour pattern of behavior based upon a circadian rhythm, which is designed to maximize eating and activity during the day and prioritize sleep at night.

Not adhering to a daily pattern of eating and drinking can have a host of negative health effects, and college students are at great risk. Studies have shown that disrupting one’s sleep-wake cycle puts one at risk for metabolic syndrome, a cluster of conditions that increases the likelihood for diabetes, heart disease and stroke.

It is recommended that, for optimal mental and physical health, individuals adhere to an eating, sleeping and waking pattern that is in alignment with their circadian rhythm. Furthermore, the avoidance of artificial light is suggested, as to not interfere with natural light’s ability to cue one’s sleep-wake cycle.
Drag Force Reduction Systems (DFRS) are new implementations to current bus designs. They target the airflow around the bus and create a smoother flow, reducing the Drag Coefficient of the vehicle therefore improving fuel consumption. Within our project we aim to target two markets. The first market are the customers who can afford a complete redesign of the exterior of buses and want to replace their whole fleet. The second market is made up of customers who can only afford smaller implementation of our design and would use the add-on parts we designed to reduce drag by a smaller amount.
Abstracts

Posters

Please Note: All abstracts are printed as submitted by project participants, and are represented in the college of the student’s project
1 Jennifer Bernal
Nonprofit Organization’s Internal Control Problems Impact on Subsequent Donations

Author(s): Jennifer Bernal
Department: Accountancy
Faculty Mentor(s): Ally Zimmerman
Session Time: Session 1

Internal controls are necessary for every company, organization or firm to run properly. The focus of this study is to observe whether donors react or not to internal control weaknesses disclosed by an organization’s auditors report, as well as their reactions after an organization corrects the weakness. We expect that donations will decrease after having knowledge of an internal control weakness and increase after that weakness has been resolved.

2 Candy Melara
Global Social Venture Consulting: MGMT 421

Author(s): Candy Melara
Department: Management
Faculty Mentor(s): Christine Mooney
Session Time: Session 4

This course entails partnering with clients to identify business problems, develop viable solutions, and present recommendations to be implemented. At the end of the semester, we will learn consulting methodologies while examining the strategic aspects of social enterprises learned in class. The focus of the class is to identify social needs in the global community, recognize social innovation opportunities, design strategic business models for social enterprises, and develop plans for strategic implementation.

3 Adam Rivas
Audit Committee, Gender Diversity, and Audit Partner Choice

Author(s): Adam Rivas
Department: Accountancy
Faculty Mentor(s): Ally Zimmerman
Session Time: Session 3

This paper examines characteristics that factor into the selection and assignment process of audit partners in the United States. I will examine whether audit partner gender is associated with audit committee member and audit chair gender. The results may indicate that clients with more gender-diverse audit committees and audit chair are more likely to have a female partner leading the audit of their company. My results clarify the important role that partner characteristics, specifically gender, play in the selection process of audit partners. My results also has significance for future research on the assignment process in the U.S., notably due to the new availability of audit partner identities on the PCAOB’s website by the cause of the new adopted auditor transparency rules in 2017.
4  Brandon Valdez  
*Assessment of a College Brand Identity*

Author(s): Brandon Valdez  
Department: Management  
Faculty Mentor(s): Mahesh Subramony  
Session Time: Session 2

College brand attributes refer to the perceived characteristics (e.g., personality and values) conveyed by a college to actual and potential students. We assessed the attributes of an ideal business-college brand as perceived by college-bound high school seniors/juniors, and community college students. Data related to brand personality and value proposition was collected using validated instruments through an online survey administered to a large sample of students in northern Illinois. We discuss the findings of this research study and its implications for enrollment and retention of business school students.

5  Julianna Waugh  
*Fraud in Nonprofits*

Author(s): Julianna Waugh  
Department: Accountancy  
Faculty Mentor(s): David Sinason  
Session Time: Session 1

Whilst living among events such as Hurricane Harvey, the earthquake in Central Mexico, and the Las Vegas shooting, it is easy to feel inclined to donate to charities. As noble as that cause is, it is easy to fall victim to terrorist financing instead of donating to what they think is relief efforts. Over the past decade, charity fraud has developed to make it easier for both everyday people and big companies to unknowingly be financing programs that are either terrorist organizations or simply not what they claim to be. The internet has made it far easier to donate to these causes through both false websites that advertise their “causes” and websites created specifically to fund someone directly, such as GoFundMe and Patron. While the ways to commit charity fraud has increased, as has the ways to prevent it. The topic of fraud in charities is a broad one, but this research will be focusing mainly on past instances of it and how it can be prevented.
The Collegiate Association of Unreasonable Social Entrepreneurs (CAUSE) is a social entrepreneurship organization at NIU that strives to make a positive social impact on the DeKalb community and beyond. We exist to educate ourselves and others about social entrepreneurship, to motivate others to engage in the social space, and to provide networking opportunities for those interested and engaged in the social space. We do this by developing strategic partnerships with a variety of organizations, hosting events including the Social Impact Summit, volunteering in the DeKalb community, and managing our own social business. Since our inception in 2013, we have donated over $20,000 to non-profits and charities around the world, volunteered over 3,000 hours within the Chicagoland area, and helped over 1,500 students and community members engage in the social space.

Emma Ruiz

*Student Recruiting; Marketing to the Hispanic Population*

The primary purpose of the current study is to build upon previous research by exploring the primary influences on Latino student’s colleges decisions. As there is an underrepresentation of Latino students in Northern Illinois University and higher education as a whole, the purpose of this study is to determine the connection between Latino high school student’s influences and how it determines the pragmatic decision of choosing a college to attend. The study will involve current Northern Illinois University college students ranging from incoming freshman to graduating seniors, in which they will be surveyed using a program called “Qualtrics” in order to collect data. The results will be evaluated and then examined to determine the primary factors that are influencing Latino student’s college decisions. In efforts to assist Northern Illinois University in recruiting and marketing to Latinos, the study will allow for the university to increase the enrollment rates and diversity on campus.
8 Oriana Flores  
*Exploring Academic and Learning Outcomes for Students Engaged in Themed Learning Communities*

Author(s): Oriana Flores  
Department: Counseling, Adult and Higher Education  
Faculty Mentor(s): Renique Kersh  
Session Time: Session 1

This study explores the impact of themed learning communities on student learning and the connection to career choice. Learning communities provide students with unique opportunities to connect with faculty and peers and to engage in hands-on learning experiences. At Northern Illinois University, themed learning communities include a cluster of courses that are linked by a particular theme and include integrative assignments. In addition, students participate in out-of-classroom experiences and, in some cases, career preparation workshops. This research will explore the literature on themed learning communities and the factors that make them successful. The outcomes of this literature review, will provide a baseline for program improvement and training faculty teams assigned to Themed Learning Communities at NIU.

9 Alexandria Wright-Patinka  
*Kinesthetic Learning and Sight Word Recognition*

Author(s): Alexandria Wright-Patinka, Natalie Andzik  
Department: Educational Technology, Research and Assessment  
Faculty Mentor(s): Natalie Andzik  
Session Time: Session 3

National tests indicate that only 38% of high school seniors are scoring at or above grade level in reading. Sight word recognition is arguably the foundation of reading and identifying these key words with automaticity is critical for literacy development. Educators in primary grades are tasked with the job of ensuring their students are able to fluently read over 180 sight words prior to entering the fourth grade. The authors of the current case study evaluated the effects of teaching sight word recognition after being exposed to a kinesthetic teaching approach. One first-grade student who was scoring below grade level in reading was included. Researchers imbedded kinesthetic learning techniques (i.e., manipulation of sand) when teaching sight words. Findings show that the participant increased her sight word recognition from 13.24% at baseline to 91.18%. The findings show that kinesthetic learning was beneficial to this participant, as she showed significant improvement towards reaching the grade-level goal of 100% sight word recognition. Authors discuss strategies for teachers to incorporate this evidence-based practice into their primary classrooms.
10 Ashley Kivikoski  
*Let’s Get Involved! Parent and Educator Definitions of Parental Involvement and Engaged Activities*

Author(s): Ashley Kivikoski  
Department: Special and Early Education  
Faculty Mentor(s): Stephanie DeSpain  
Session Time: Session 2

Parental involvement in education is mandated by law (i.e., NCLB, IDEA) and it is the educators responsibility to reach out and include parents in the education of their child(ren). To date, there is little available research on parent and educator definitions of parental involvement and the activities with which they engage in or are expected to engage in. The level and intensity of a parent’s involvement is a multifaceted issue (i.e. home environment, job demands, culture); however, investigating definitions, expectations, and activities is an important step in understanding whether or not educators and parents are on the same page. Therefore, the purpose of this project was to investigate parent and educator definitions of parental participation. It was further to investigate educators’ expectations for parent involvement and determine whether parents engaged in activities that matched those expectations. In order to conduct this investigation, I developed online surveys to collect data from parents and educators on their definitions of parental involvement, and engaged and expected activities. The surveys involved questions aimed to answer the following research questions:  
1. How do parents define parental involvement? What activities do they report being involved with?  
2. How do teachers define parental involvement? How do teachers expect parents to be involved?  
3. Do parent and teacher definitions of parent involvement match the involvement activities they engage in or are expected to be engaged in?  
A qualitative analysis of definitions and engaged/expected activities was conducted following data collection, and findings will be reported during this presentation.

11 Hend Alkarzon  
*Breaking the Gender Stereotypes: Recognizing the Power of Women*

Author(s): Hend Alkarzon  
Department: Other  
Faculty Mentor(s): Amy Newman  
Session Time: Session 4

This paper addresses the importance of women’s influence in the effect, change, and education of future generations. While it remains true a minority of women in the non-western world participate in the workplace, it is a testament to their achievements that this minority group acts as a role model and an agent for change in the society. There is a great potential behind women and in their ability to influence, lead, and become an inspiration to young women all over the world. This paper discusses key points on how women can be provided with equal opportunities, the necessary skills needed to successfully reach leadership positions, and finally, the barriers placed on these women’s advancement. This research highlights interviews with one of the top 100 most powerful Arab business women in
2017. The data for this research is collected through interviews and an online survey, with a sample size of 140 (110 females and 30 males) from 9 different countries around the world. The interviews have identified the factors that enable the aspiring women to lead, and also what prevents them from reaching the leadership positions. Results indicated about 62% of survey participants do not believe women are treated fairly, and 50% of the participants believe there is very little being done about gender equality.

12  **Hope Brinkmann**  
*Exploring the Motivations of College Students’ Exercise Habits at a University Recreation Center*

Author(s): Hope Brinkmann, Jennifer Jacobs  
Department: Kinesiology and Physical Education  
Faculty Mentor(s): Jennifer Jacobs  
Session Time: Session 3  

The current research study is looking to explore the different forms of motivation for exercising among students here at Northern Illinois University. Motivation can range from unknown reasoning (Amotivation), to self-improvement and pleasure (Intrinsic), or to seek external rewards (Extrinsic). The different forms of motivation are extremely useful for understanding how people choose to commit to exercise participation.

In the past, research studying motivation has built a formal questionnaire, The Sport Motivation Scale (SMS), to help determine which type of motivation people are typically fixated upon (Blais, et al, 1995). This prior research sets the stage for us to be able to gauge motivation factors in participants, as well as see if students typically follow a guideline of both high intrinsic and extrinsic motivation to high frequency patterns (as observed with elite athletes and exercisers). Therefore, the purpose of this research is to examine college-age students’ motivations to exercise. We are looking to include demographics from a variety of backgrounds including, race, age, exercise frequency, etc. Using a self-developed demographics questionnaire and the SMS, we want to collect data and see if we can conclude any patterns, correlations, and/or anomalies between the college-age population and strong motivational backgrounds. Such data is useful for creating / developing marketing strategies and programs specific to the NIU recreation community, which could improve attendance at the Student Recreation Center and to build upon positive (intrinsic) motivations and adherence to a healthy lifestyle.
13 Derek Duleba  
*Contemplating Contemplative Practices in Higher Education: An Example of Engaged Teaching, Learning and Scholarship*

Author(s): Derek Duleba, Shannon Dudzienki, Marina Galluzzo, Esther Langer, Brisa Martinez  
Department: Leadership, Educational Psychology and Foundations  
Faculty Mentor(s): Leslie A. Sassone  
Session Time: Session 1

This work will be a visual representation of the panel discussion held at the NIU Engaged Learning, Teaching and Scholarship Conference as a Best Practice Concurrent Session in March 2018. Five NIU students and their Professor reflected on the Fall 2017 upper-division Honors Seminar in Philosophical Foundations of Education. The URAD experience invites the continuation of our participatory action research and the opportunity to share the effectiveness of contemplative practices in higher education at NIU. The poster will evidence how students contributed to the co-construction of the course. This will include what we did (process/content/practices); what made the class unique; what we got out of it; and what we are doing and going to do moving forward.

14 Courtney Rieb  
*Using Self-Monitoring to Increase On-Task Behavior: An Intervention in an Elementary School Classroom*

Author(s): Courtney Rieb  
Department: Special and Early Education  
Faculty Mentor(s): Natalie Andzik  
Session Time: Session 4

Educators need students to be devoted to learning so that they increase their academic skills and develop a curiosity and innate desire for discovery in the world around them. However, most students are unable to concentrate for long periods of time and thus do not remain on task all the time. On-task behavior is a component of positive classroom performance, which is influenced by effective classroom management, something that teachers are constantly striving to improve. It can be defined as the time that students are spending with the material that the teacher has presented, being fully invested in the learning, and remaining engaged in the instruction and learning activities. Once a student is distracted, it can be difficult for him/her to refocus independently without support. Through self-management strategies that help students monitor their own behavior, teachers can help students learn how to autonomously stay on-task with what they are learning and take data and reflect on their behaviors. Self-management (e.g., self-monitoring) is successfully accomplished when a student learns how to recognize and record when a target behavior happens (Dunlap, Dunlap, Koegel, & Koegel, 1991). Researchers identified a student with a lack of on-task behavior and worked with him to develop a self-management strategy that was effective in increasing on-task behavior. This helped the student develop independence and self-reliance in individual classwork.
The purpose of this project is at the request of Dr. Virginia Naples, a professor at Northern Illinois University at the Department of Biological Sciences. The design challenge that was set forth deals with the necessity to provide the academic and research communities with a system that can accurately investigate fossils of extinct fauna "in vivo" movements. In our case we will be investigating the supination and pronation movements found in the forelimb of a Smilodon. This is in response to the lack of actual constraints that are not present in current digital modeling techniques being used in the paleontology community.

Retrofit mechanism designed to fit over an existing deadbolt. When attached, will allow the user to store speaker-dependent voice commands and then say them into a microphone to unlock the deadbolt from the outside.

Using newer technologies we are currently investigating the different uses in being able to help someone who is disabled, and using our research to try and increase the overall accuracy of the technology. 1st part of the project is using Leap Motion with hand gestures to control a car and a claw, and the second part of the project is using eye tracking and blink detection to also control a car.
Voice Activated Home Automation (V.A.H.A.) allows users to control the environment inside their home with their voice. By using voice commands, V.A.H.A will use Google’s Cloud speech API and Amazon’s smart home scale API to detect and recognize the voice command and send a signal to the appropriate device inside your home, such as the thermostat, lights, TV, etc using the XBee ZigBee’s Mesh network. V.A.H.A will give users the ability to control the electronics inside their home using just their voice from anywhere in the house.

In the beginning V.A.H.A will only be able to control simple electronics such as turning different lights on and off, turning on a fan to desired settings, and controlling the temperature of the house by changing the thermostat’s level; However, the potential for this project is huge and in the near future we hope to expand V.A.H.A to be able to control bigger objects such as changing the refrigerator settings, controlling the oven’s temperature, locking and unlocking your home’s doors and windows.

Our objectives for this project are to use Google’s and Amazon’s API to detect and recognize the users voice and decode it to send the command to our XBee ZigBee. Once the XBee ZigBee receives the command we want it to communicate with the electronics as needed. For this project we want V.A.H.A to turn light bulbs on and off and be able to differentiate between that and changing the temperature on the thermostat to the desired setting.

Video-gaming is a growing market, and with the advancement of technology it only continues to grow. Before desktop computers and laptops were powerful enough to run most games, the typical consumer would purchase a console dedicated to playing video games. Nowadays, many households have a powerful laptop or desktop capable of handling modern video games. Users who wish to continue gaming on their new devices must adapt to keyboard and mouse controls, or purchase a controller that works with their system.

Scope: (1) Construct a breadboard circuit that will output a signal to control the cursor on the monitor of a computer. (2) Construct a breadboard circuit with all the necessary buttons from a typical video game controller represented. Test that each button is able to be read, pressed and un-pressed, as well as the analog triggers and joysticks. (3) Combine these circuits with existing drivers for both mouse control and video game controller inputs. This will be done using Windows. (4) Begin taking data on accuracy and
speed of response. (5) Finalize circuit so it can be put onto a PCB. Model a casing for the controller to be 3D printed. (6) Build controller and test to ensure engineering requirements are met.

20  Jake Goes  
IMC Gear

Author(s): Jake Goes  
Department: Electrical Engineering  
Faculty Mentor(s): Donald Peterson, Simon Kudernatsch  
Session Time: Session 2

With many of the limitations that exist with traditional motion capture systems, there is a need for a system that can be used in a real world setting. Our project is to plan, design, build, and test a portable motion tracking system with a goal of having several IMU (inertial measurement units) functioning in a linked system that can store the data locally and transfer the data to a computer program to interpret the data into anatomically significant terms. The system will provide accurate data, not require constant connection to external equipment, be able to store large amounts of data, be able to recreate the user’s joint angles in the software, and will facilitate a full range of movement on the part of the user.

21  Emanuel Williams  
Flow Bandz, a Smart Gesture Controller

Author(s): Emanuel Williams, Manas Verma  
Department: Electrical Engineering  
Faculty Mentor(s): Reza Hashemian  
Session Time: Session 4

Designed with the intent to change how we interface with technology, these personalized, smart, wireless and wearable gesture controllers can record a user’s personal gesture and assign said gestures to a function written in a computer application. Digital Media Control, Database interface control, and mechanical control are few example of things that can be controlled, with imagination being the only limitation. Wireless gesture controllers that control and interface with aspects of computers will be desired as computers become more advanced and faster. With a focus in the idea of IoT (Internet of Things), this design was made with the emphasis of wireless Bluetooth networks (piconets) devices and wearable technology. As technology continues to grow, so does our perception of reality and how we classify objects; a new class of objects are being born.
Dhakshenan Pushparajan  
*Paper Based Diagnostics using Mechanical Switches and Programmable Sequential Loading*

Author(s): Dhakshenan Pushparajan, Yashodeep Patil  
Department: Electrical Engineering  
Faculty Mentor(s): Venumadhav Korampally  
Session Time: Session 2

Diagnostics is a vital yet, expensive component in the medical field. Due to the cost, medical diagnosis becomes unavailable to many people. Hence, they are not able to receive the medical attention that they may require. This project is aimed to developing a new method of microfluidic diagnostics using capillary actions of paper to create a new method of paper-based diagnostics. This will be achieved by creating a circuit using hydrophobic areas on paper and mechanical switches designed out of Mylar, double sided tape, and laminate sheets. The end goal is to reduce diagnostics costs in the medical field.

Leticia Aguirre  
*Optimization of “Picked” Parts Locations within the Machesney Park Warehouse*

Author(s): Leticia Aguirre, Garret Foster  
Department: Industrial and Systems Engineering  
Faculty Mentor(s): Purushothaman Damodaran, Christine Nguyen  
Session Time: Session 4

Woodward stores certain inventory at a separate warehouse near its two manufacturing facilities, Loves Park Campus and Rock Cut Campus. MPW oversees the storing, kitting, cleaning, and delivering of kits to the manufacturing facilities. A 24-hour turnaround is expected. Due to the current inventory system, this turnaround time is difficult to maintain. Primarily, the problem being Pickers must reach parts up to 7 feet high and crouch down for parts located near floor level. Time studies completed indicated that Pickers walk on average 300 feet to complete an order.

Items are stored in random locations throughout the racks, ensuring identical components from different lots are kept separate to guarantee traceability. The main objective consists of identifying optimal locations for SKU’s. By identifying the optimal location, kitting times are minimized. Optimization can be accomplished by grouping product locations based on order families. Assumptions must also be made, such as: floor layout will remain the same, no changes to current software, manual overdrive is possible, although timely. Finally, parts are assigned to random open bins.

Being cognizant of assumptions and objectives, heat maps were created to determine the locations that are most frequented, facilitating visualization of part locations that needed to be transferred to either rack shelves closer to chest level and/or to locations closer to drop-off points. This is to minimize the Pickers’ paths to collect all necessary parts for kits. By transferring highly frequented locations to ergonomic heights, it minimizes safety risks and health concerns, improving Woodward's bottom-line.
24  Daniel Field  
_Ergonomic Evaluation of Classical Guitar Implements_

Author(s): Daniel Field  
Department: Industrial and Systems Engineering  
Faculty Mentor(s): Jaejin Hwang  
Session Time: Session 3

Musicians are often subject to risk factors that increase their chances of developing musculoskeletal disorders. Classical guitarists in particular can be subject to lower back and shoulder pain, especially after many years of practice. The purpose of this study was to evaluate the two types of ergonomic implements (footstool and guitar support) that are commonly used by classical guitarists today. Although some of these implements are marketed as ergonomically beneficial, there has been little definitive research to substantiate those claims.

25  Stephanie Bartoli  
_Daubert Chemical Drum Line Implementation_

Author(s): Stephanie Bartoli, Hannah Luehrs  
Department: Industrial and Systems Engineering  
Faculty Mentor(s): Purushothaman Damodaran  
Session Time: Session 4

Daubert Chemical Company manufactures products such as adhesives, corrosion preventative coatings, industrial greases and various other chemicals. These products are mixed in large tanks throughout the facility. In the metalworking department, these tanks are routed through pipes to a central drum filling line to be filled into 55-gallon drums. Daubert has been receiving frequent complaints from their customers due to cross contamination of different products during the drum filling process. In an effort to reduce contamination in the piping, product is being wasted at the beginning of the filling process when the new product is pumped into a waste bin until the contamination from the previous product is alleviated. This increased waste and results in low product yields.

The goal of the project is to implement a second drum filling line into the department in order to reduce contamination and waste. Throughout the duration of the project, various industrial engineering tools were used in order to make decisions such as optimal location, optimal fill-station type, workload balancing, and pipe mapping.

Through the implementation of the secondary filling line, ergonomics will be improved, throughput will be increased, cost will be reduced, and customer relations will be improved. Once the new line was ordered, 5S and 5S audit forms were implemented throughout the department, and a system was implemented for tracking partial drums. The various tools that have been used throughout the semester include flow process charts, spaghetti diagrams, 3D SSPP Software, time studies, AutoCAD, 5S.
To provide an all-in-one unit that will be mounted on each of the fridge derby karts to track the position, velocity, acceleration, and power consumption. Each measured variable will be saved to an online source, as well as displayed on a LED screen in real time.

Aurora Specialty Textiles is a manufacturer of finished and coated canvas textiles. One of the main lines run within the facility is Range 2, which runs a variety of coating and dyes that cause delays in production changeover times. These changeover times consist of the take down of one production run, the cleanup between, and the setup of the next production run. Currently the changeovers take on average, about one hour, which is a big problem for the company. The basic strategy to reduce this changeover time will consist of three phases: prep work operating procedures, machine/system cleanup changes, and production scheduling optimization. Prep work is defined by the standard tasks that can be done before the changeover while the range is in operation. This will simply subtract time from the changeover. Machine and system cleanup changes will consist of working on ways to automatically clean the stations that require the most attention so it will free up time for operators. This will be used to reduce time during changeovers as well as ergonomically help the operators. The third phase will consist of scheduling. This will reduce the likelihood of switching between products that cause larger clean up problems.
28  Joel Rushton  
*AutoSub: Underwater Vehicle Thruster Calibration and Dynamics Estimation Utility*

Author(s): Joel Rushton, Charles Fortner, Ishan Chavan, Brandon Miller  
Department: Mechanical Engineering  
Faculty Mentor(s): Brianno Coller  
Session Time: Session 2

Underwater Vehicles, whether remotely operated or autonomous, are mainly controlled by calibrated thruster systems. Calibrating these systems is time consuming, expensive, and requires knowledge of the vehicle’s dynamic behavior. A system is presented that automatically calculates vehicle dynamics and outputs power values to each thruster in a multi-thruster control system. This system achieves desired translational and rotational movement without needing to know exact vehicle dynamics ahead of time. This calibration is accomplished by measuring the response of each thruster using an inertial measurement unit (IMU) embedded in the vehicle. Each thruster is switched on and the motion is captured with the IMU until the craft reaches steady-state motion. The resulting thrust vectors are stored and used in an algorithm to resolve overall desired motion based on the available thrust vectors in the model. This process also allows us to generate an approximated model of the vehicles dynamics that may be used as initial estimates in machine learning based adaptive control systems. This software may be used by commercial robotic underwater vehicle manufacturers to save development time by utilizing automatic calibration.

29  Madisen Frye  
*Streamlining Patient Scheduling and Registration at KPG Lab and Radiology*

Author(s): Madisen Frye  
Department: Industrial and Systems Engineering  
Faculty Mentor(s): Gary Chen, Purushothaman Damodaran  
Session Time: Session 4

On December 1, 2015 KishHealth System joined Northwestern Medicine (NM), expanding the system to 6 hospitals and 90 sites of care across 8 Illinois counties. An important part of providing exceptional patient care is ensuring the patients have a great experience. This experience is measured as the patient’s “Likelihood to Recommend (LTR)” in patient satisfaction surveys. In fiscal year 2018, KishHealth Physicians Group (KPG) Lab patient’s LTR was at the 13th percentile, while KPG Radiology departments were between the 6th and 13th percentile when comparing to other outpatient facilities in the country. By 2020, Northwestern Medicine’s goal is to have all facilities rank above the 90th percentile for LTR. The goal of the project is to help NM increase their LTR metric for KPG Lab and Radiology to the 25th percentile. After creating a Pareto chart, results showed that 80% of negative comments from the patient satisfaction surveys were categorized under registration, scheduling, and wait times. To help NM achieve their goal, a simulation model of KPG Lab and Radiology and a simulation model of Kish Outpatient (OP) Call Center was created. Kish OP Call Center is a source for scheduling and registering patients for all of NM’s outpatient facilities, except KPG. The simulation models were used to test different scenarios including cross-training, transferring the scheduling and registration processes to
Kish OP Call Center, and staffing levels to determine which scenario decreased patient waiting time the most. This reduction of patient waiting time will ultimately increase patient’s LTR scores over time.

31  Samuel Smith  
Designing Woodward Test Preparation Station and Process Flow

Author(s): Samuel Smith, Michael Hoover  
Department: Mechanical Engineering  
Faculty Mentor(s): Purushothaman Damodaran  
Session Time: Session 3

Woodward recently opened a new campus in Loves Park, IL, which produces subcomponents for aircraft jet engines. Their air valve product line currently produces 7,000 units per annum, with an expected peak production of 12,000 units across 17 different part numbers by 2022. Each unit undergoes an Acceptance Test Procedure, which involves the operator manually inserting units and changing set-ups between tests. This project is to design a new process and preparation area in order to minimize changeover time and machine idle times using industrial engineering tools including time studies, man-machine charts, level loading, and ergonomic analysis. Forecasted demand shows a takt time of 16.8 minutes, with time studies indicate that test take between 50 and 55 minutes. Changeover times are presently 5 minutes without adaptor changes, and 8 minutes with. To minimize the changeover time, a preparation area for operators to pre-attach adaptors to units and allow for quick insertion and ejection of units from the test stand is proposed. Part numbers are also allocated to specific test stands in order to minimize the number of set-up changeovers occurring.

32  Paul Doomis  
The Living Gate Project

Author(s): Paul Doomis  
Department: Mechanical Engineering  
Faculty Mentor(s): Federico Sciammarella, Nicholas Pohlman  
Session Time: Session 2

The Living Gate Project aims to create a solid mass feeder that utilizes a belt and flexing control surface via a moving gate to provide a consistent and clog-less flow rate of the mass. Such a steady mass flow feeder would prove optimal for sensitive manufacturing processes such as continuous chemical reactions or for feeding biofuel gasification chambers. The design primarily consists of a driven belt, a reservoir, and a gate driven vertically by an actuator governed by a feedback loop.
33  **Hannah Higgins**  
*Granular Flow Profiles in a Conveyor Apparatus*

Author(s): Hannah Higgins  
Department: Mechanical Engineering  
Faculty Mentor(s): Nicholas Pohlman  
Session Time: Session 3

Exploration of granular behavior in a conveyor apparatus aims to achieve uniformity in mass flow rate by determining velocity profile data with mass flow rate. The velocity profiles as a function of particle position are generated using high-speed imaging of uniformly-shaped particles in a bottom-driven conveyor belt system. This velocity information is used to determine how the shear rate decays as a function of different locations within the particle bed. Comparison of gravity driven flows will determine consistency of shear rate within a confined volume compared to flow decay relationships found in past experiments that focused on gravity driven flow. In past experiments, the velocity profiles are linear near the shearing layer of particles, but became exponential toward deeper layers in the bed. If it is seen that velocity relationships differ between those found in gravity driven systems and those found in belt driven systems, this could point towards unexplained physics phenomena. The application of this research can serve to validate simulations in fluid mechanics and physically demonstrate a process that can be further developed and customized for industry applications, such as feeding a reactor. For future experimentation, the image processing will be further developed to process images of particles that have random distribution and orientation so that the velocity relationships of non-uniform particles can be explored.

34  **Amro Shanshal**  
*Experimental Calibration of Monitoring Range and Effectiveness of a Quadrotor Platform*

Author(s): Amro Shanshal  
Department: Mechanical Engineering  
Faculty Mentor(s): Sachit Butail  
Session Time: Session 2

Invasive plant species pose drastic environmental and economic threats to our ecosystem around the world. Monitoring invasive species, however, is a time- and labor-intensive activity, and close-range monitoring is needed to identify driving factors behind the dispersal of invasive species. In this context, aerial platforms can be used to monitor invasive plants species at close range as they spread over a region, however long-term use of aerial platforms is constrained by battery usage, which in turn is affected by environmental conditions. Specifically, variation in environmental variables such as wind speed, wind direction and temperature can cause high variability in flight time. With respect to monitoring itself, altitude can affect the resolution of visual data collected. In this project, experiments are performed to calibrate a battery usage for effective monitoring of plant invasive species. Once created, a function for battery usage is used as an input to a genetic algorithm that solves a corresponding optimal path finding problem for a quadrotor platform over a wide range of environmental conditions. The quadrotor platform will be used monitor and quantify the spread of
Garlic Mustard, a notorious invasive species, along a local river bank over several weeks and will be shared with ecologists and conservation biologists for further analysis and research.

35 Victoria Ewert  
*G&W Electric Recloser Testing*

Author(s): Victoria Ewert  
Department: Mechanical Engineering  
Faculty Mentor(s): Ji-Chul Ryu  
Session Time: Session 4

Electric reclosers are devices which monitor the current in a power line and automatically break the circuit should electrical anomalies be detected. These devices can be manually tripped by using a handle located on the recloser unit, usually to allow for a lineman to try to fix a fault or outage. G&W Electric, a power equipment manufacturer, contacted NIU to construct testing devices to detect the maximum force needed to trip these handles on two separate recloser models (The VIPER S & VIPER ST). These testers were to be automated, easy to use, safe in an industrial environment and last through hundreds of thousands of cycles. The two recloser models had unique geometries to mount to and different force-requirements, therefore two different testing models were needed. A motor and a control system connected to a lever arm mirroring the natural motion of the handle was designed for the VIPER S and the resultant force was sensed with a load cell. Due to limiting geometry, the VIPER ST instead used a linear actuator, a threaded connection and load cell to measure the force. Hopefully, the devices will be used to increase the reliability of G&W’s testing and provide linemen with concerns when solving power outages. In the future, Wi-Fi or Bluetooth recording capabilities could be incorporated to improve the efficiency of G&W’s quality control process.

36 Chris Ulloa  
*Automatic Sample Loader*

Author(s): Chris Ulloa  
Department: Mechanical Engineering  
Faculty Mentor(s): Ji-Chul Ryu  
Session Time: Session 2

Many companies run into the issue of replacing samples that are scanned for extended periods of time. An operator who is tasked with replacing the samples costs a company money and time. To improve the scanning process efficiency, companies buy overtly expensive robotic manipulators. The Automatic Sample Loader (ASL) is a cost-effective robot manipulator which uses a simplistic design to replace up to three samples efficiently. With the capability to replace these samples automatically, the company will be able to scan a higher number of samples in a day, thus reducing affiliated labor costs.
OEM driveshafts for the Polaris RZR often operate with dangerous vibrations due to poor balancing, especially in high speed races. Our team was tasked by RCV Performance Products to address this issue by providing an aftermarket carbon fiber replacement driveshaft.

Student designed radiant heating system that utilizes flatplate solar collectors to replace the primary heat source (I.E. water heater). The system will be optimized to provide heat to a user specified area. The variables being optimized and recommended will consist of; pipe diameter, pipe length, pipe material, pump selection, zones required, storage tank sizing, number of flatplate solar collectors, and concrete thickness.

To help promote the growth in STEM (science, technology, engineering, and math) careers, ComEd created the Icebox Derby STEM cup challenge. The Icebox Derby is a challenge that encourages young girls to engage in hands on challenges involving innovations. The challenges revolve around building a derby car out of recycled refrigerators. The whole process takes place over four build days and is used to further encourage STEM. In previous years, a homemade jack was used to lift the kart frame high enough for the girls to work on the car. However, lifting the frame did not involve the girls, and when the frame was on the jack, it was unstable and ultimately deemed unsafe. Our goal was to design a lift that the girls can operate safely. The lift operates using hydraulics to raise and lower to ideal working heights, operating on a simple scissor design. The lift ensures the girls have access to all aspects of the
frame, yet not have to work on the floor or have the frame be unstable. The final product includes a locking mechanism for additional safety at maximum height and locking casters for ease of mobility. The final product can also be marketed for other small vehicles, not just go-karts. Our mission is to provide a safe, hands on lift that the girls will be able to operate when completing challenges involving the Icebox Derby car frame.

40 Roberto Flores
*Safety Barrier for FANUC LR Mate 200iD*

Author(s): Roberto Flores, Justin Gleason, Justin Caudill
Department: Technology
Faculty Mentor(s): Andrew Otieno, Theodore Hogan
Session Time: Session 4

Senior design project for College of Engineering Technology focusing on safety and automation. Designing and building a fully functional safety enclosure for the FANUC LR Mate 200iD industrial robot located in Still Hall 103. Integrating OMRON STI donated electrical equipment with aluminum frame and steel grates to provide functionality to robot while providing safety and efficient use of donated components for future use at Northern Illinois University.

42 Joseph Petsinger
*Effects of Travel Speed and Powder Flow Rate on Bead Quality in Direct Energy Deposition Additive Manufacturing*

Author(s): Joseph Petsinger, Federico Sciammarella
Department: Technology
Faculty Mentor(s): Federico Sciammarella
Session Time: Session 4

This research project involves analyzing the quality of deposited metal beads and how they are affected by powder flow rate and travel speed in Direct Energy Deposition (DED). This will be done by depositing beads using a Laser Engineered Net Shaping (LENS) machine while varying the travel speed of the head. Each bead will then be analyzed in order to observe the quality of desirable outcomes in terms of height-to-depth ratio, amount of porosity, microstructure, and hardness. The data collected from these measurements will be analyzed in order to see where the ideal bead can be developed as the powder flow is increased from one side to the other, while maintaining proportional travel speed and consistent input energy. The objective of these experiments is to develop a dynamic test that can provide an acceptable range of values for powder flow rate to travel speed ratio that deliver consistent and desirable properties for deposited metal bead.
Chase Sommers

Gauge Block Comparison Automation

Author(s): Chase Sommers
Department: Technology
Faculty Mentor(s): Andrew Otieno
Session Time: Session 2

Our project is for Mitutoyo and the aim is to automate the process of measuring and comparing gauge blocks and to eliminate the need for operator data entry. The goal for this automation is not to eliminate the need for the operator but to decrease the time it takes to complete the set and increase productivity. This will be accomplished through the use of a robot and vision system. The operator will bring the gauge blocks into the controlled environment on the tray as they do in the original process. Next, the operator will go to the computer and run a program on the robot. Once the program is started the robot will go over to the designed tray and check for the first block. If a block is not there, the robot will go to the next block and continue this until there is one to pick up. If a block is present, the robot will pick the block and take it to the camera. The camera will read the unique string of characters at the bottom of the gauge blocks using an optical character recognition software (OCR) and put the result into a spreadsheet. Once the camera has read that string of characters, the robot then moves the gauge block onto the comparator and waits for it to take the measurements. After the comparator measures the block, the robot will then pick up the gauge block and move it back to the tray.

Jason Kors

Solar-Powered MicroGrid

Author(s): Jason Kors
Department: Technology
Faculty Mentor(s): Liping Guo
Session Time: Session 4

According to Worldometers.info, the world population in 2010 was recorded to be 6,958,169,159 people. In 2017 the world population increased to 7,550,262,101 people. In just a seven-year period this difference produced an increase of almost six-hundred million new people living on planet earth. This is roughly 84,000,000 people being born every year. According to the Global Energy Statistical Yearbook, during the same time frame from 2010 to 2017 the global power consumption went from 13,224 TWh to 15,339 TWh. This is an increase of 2,115 TWh in just seven years which is roughly 302 TWh increase per year. These yearly averages raise the question for how the world of energy production will be able to continue satisfying the current energy consumption. (Current World Population, 2018) (Electricity domestic consumption, 2018)

This is where the Solar-Powered MicroGrid will be an aid in the collection of renewable energy to help sustain the massive amounts of energy being consumed by the population. The Solar-Powered MicroGrid is an energy network offering the ability to distribute power gathered from renewable solar energy. This can be demonstrated on a small scale to emphasize the practicality of such a system on a much larger platform. This is accomplished through the creation of a teaching aid that uses a solar panel.
to harvest solar energy; a solar controller to convert the solar energy into electrical energy, store the collected energy to a backup power source, and distribute it to various loads; and a micro-controller to process the controls of which loads to receive power on demand.

Citations

45 Jayson Shiau
Machine Vision Eye Diagnostics

Author(s): Jayson Shiau
Department:
Faculty Mentor(s): Wei Li
Session Time: Session 4

Machine vision eye diagnostics is a software and hardware based system intended to determine the level of intoxication due to alcohol consumption in an individual by tracking the individual’s eye movements. It is designed to operate non-invasively and with minimal user training when compared to current market and medical solutions.

The scope of this project is both medical as well as public safety. The system has been designed to be discrete enough to be installed in any car and then operate as a proactive measure against drunk driving. Using pre-existing python libraries, off-the-shelf computer boards, and basic LEDs, the system can then conduct a eye test that examines the three main areas of alcohol’s effect on eye movement: horizontal saccades, latency, and eye velocity.

The overarching goal and objective of this project is to meet a critical need for a quick, non-invasive, and low cost alternative to determining if an individual is intoxicated. Currently, breathalyzers and blood tests are accurate but can cost thousands of dollars and in the case of blood tests, require medically trained individuals to conduct the test. There also exist medical eye testing equipment that perform similar functions as our proposed system but are used to diagnose neurological conditions. The objective of this project is to create a new way to determine intoxication levels in individuals that is both compact enough to be installed in a car with almost no physical presence, no medical or background training to use, and less than $500.
**46 Alyssa Ashmore**  
*Analyzing Academic Equity Gaps Among Undergraduate Students with Disabilities*

**Author(s):** Alyssa Ashmore  
**Department:** Allied Health and Communicative Disorders  
**Faculty Mentor(s):** Bryan Dallas  
**Session Time:** Session 3

**Purpose:** A comparison of students with disabilities (SWDs) and students without disabilities (SWODs) found that performance gaps existed in specific undergraduate courses, as well as persistence. The purpose of this pilot study is to investigate potential factors influencing 1) academic performance gaps between college SWDs and SWODs and 2) freshman SWDs not returning for their sophomore year.

**Methods:** A mixed methods online survey was e-mailed to 232 undergraduate students registered with disability support services (DSS) at a 4-year public university, which rendered 48 completed surveys. Via the survey, students used a Likert scale to report course experiences related to their disability. Quantitative data was compiled into SPSS and analyzed. Qualitative data taken from a small focus group was compiled into tables and inductive content analysis was used to analyze the data.

**Results:** In general, students agreed that required technology was accessible. Overall, students neither agreed nor disagreed that accommodations positively impacted course performance, DSS services were supportive of needs, disability negatively impacted course performance, instructor had been supportive, and other services at the university had been supportive of needs. On average, freshman agreed they would return for the following semester and 88% did indeed return. Anecdotal data gathered from focus groups was consistent with survey results.

**Conclusion:** This pilot study found that students provided mostly neutral responses related to factors that could impact academic success. The sample size was too small to make definitive conclusions or recommendations; therefore, a multi-institutional study is recommended to replicate and expand the current study.

**47 Cassidy VanZuiden**  
*Play on Words: Assessing the Influence of Language Context on Repetitive Speech in Children with Autism Spectrum Disorder*

**Author(s):** Cassidy VanZuiden  
**Department:** Allied Health and Communicative Disorders  
**Faculty Mentor(s):** Dr. Allison Gladfelter  
**Session Time:** Session 4

**Purpose:** Although repetitive speech is widely documented in children with Autism Spectrum Disorder (ASD), the influence of structure in the language context on the use of repetitive speech remains unknown. This information is essential for clinicians to efficiently target this pervasive autism-related symptom in intervention. The purpose of this study was to determine if the degree of structure of the language task impacts the frequency and type of repetitive speech.

**Method:** This study explored repetitive speech use in four school-aged, male children with ASD in two different language tasks: storytelling (more-structured) and play-based (less-structured). Language samples were collected, orthographically transcribed, and coded for four types of repetitive speech:
immediate echolalia, delayed echolalia, verbal stereotypy, and vocal stereotypy. The frequency and type of repetitive speech were analyzed.

Results: Participants produced more utterances overall during the play-based context, but produced less repetitive speech during the storytelling task. There were no notable differences in the types of repetitive speech between the two tasks.

Conclusions: In intervention, children with ASD may rely less on repetitive speech during more-structured (albeit still naturalistic) language tasks than less-structured tasks. To confirm these exploratory results, future research with larger sample sizes and longer language samples are needed.

48 Erica Barron
The Implications of Language Learning Disabilities and Texting

Author(s): Erica Barron
Department: Allied Health and Communicative Disorders
Faculty Mentor(s): Patricia Tattersal
Session Time: Session 2

The purpose of this study is to analyze how texting has evolved over the last fifteen years in use and form and assess the impact of foundational reading, writing, and spelling skills on texting in adults as compared to children. To answer the question about text use, college students participated in an online survey. Results were compared to a 2003 study done at the University of Washington which found that students used texting the most to maintain friendships. (Thurlow, 2003). To answer the questions regarding form and foundational skills, college students participated in a session in which they were administered standardized testing, completed a survey, and shared five texts they had sent in the past week. Results were compared to the Thurlow study for changes in form. Additionally, to determine if texting proficiency is related to the same foundational skills needed for children, data was compared to a study done at Coventry University in the UK eight years ago (Plester et al, 2009) on children with the mean age of 10.6, who had used texting as a form of communication. Results will be used to better understand the implications of language skills on use of social media in young adults.

49 Priya Patel
Music and Memory

Author(s): Priya Patel
Department: Allied Health and Communicative Disorders
Faculty Mentor(s): Jamie Mayer
Session Time: Session 3

Music and Memory is a national and international program designed to take advantage of the privileged access of music to language, cognition, and emotion for individuals with dementia. We examined preliminary implementation and qualitative results in a DeKalb-area nursing facility, Pine Acres. Preliminary data will be used to determine future directions for program design and data collection.
Kristen Ernst

Postural Control Characteristics of Dance Majors

Author(s): Kristen Ernst
Department: Allied Health and Communicative Disorders
Faculty Mentor(s): Mary Jo Blaschak
Session Time: Session 2

This study examines postural control characteristics of dance majors of students at Northern Illinois University. The characteristics include vision, the vestibular system, the inner part of the ear, and somatics, specifically muscle tension in the legs and feet. Measurements will be taken from dance majors using a balance system through four different tests. The dance majors will be given a Sensory Organization Test (SOT), Motor Control Test (MCT), an Adaptation Test (ADT), and Limits of Stability Test. In the SOT, participants will stand on a platform with their eyes opened and closed. In the MCT, the platform will move forward and backward in small, medium, and large bursts. In the ADT, the platform will push the toes up and let them go down in random intervals five times. Lastly, in the Limits of Stability Test, it measures the reaction time and the accuracy in shifting the body in each direction. From this study, it attempts to prove that dancers rely heavily or prefer visual information for balance rather than the vestibular system or somatics, while still having strong usage of the other two characteristics, especially during the case of moving without losing stability. This study can go on to prove that dancers have better balance than non-dancers. It can go on to do further research and how it can further help people with postural issues.

Maryan Saman

Compassion Fatigue in Registered Nurses: Strategies for Prevention

Author(s): Maryan Saman
Department: Nursing and Health Studies
Faculty Mentor(s): Jie Chen
Session Time: Session 1

Introduction: Compassion fatigue is defined as a state of tension that individuals experience from an exposure to single or multiple traumatic events that cumulate over time. The nurse responds to the suffering of a patient from critical conditions with dissociation, anxiety, and irritability, and may experience secondary traumatic stress. Compassion fatigue can lead to increased turnover rates, decreased job satisfaction, and disengagement from patient care in the critical care setting. It is important to recognize that there are solutions that would prepare nurses for preventing compassion fatigue from occurring. The aim of this literature review was to identify the existing evidence-based strategies to prevent compassion fatigue among registered nurses.

Methods: A literature search was conducted to address a research question “what are the evidence-based strategies to prevent compassion fatigue among registered nurses?” Inclusion criteria included articles published in academic journals in English within the past 5 years. The search was conducted
through CINAHL database, with key terms “compassion fatigue,” “moral distress,” “secondary traumatic stress,” “prevention,” and “nurses.”

Results: Journaling, meditation, mindfulness-based interventions, resiliency, and educational programs were found effective in significantly decreasing the level of compassion fatigue among nurses. The major strategies identified from these programs include self-management, teamwork, and organizational support.

Conclusions: Compassion fatigue can be prevented with self-management, teamwork, and organizational support. The study findings will be utilized to further raise awareness on compassion fatigue and provide information to nurses, nursing students, staff, and the general public on how to prevent compassion fatigue.

52 Grace Louis

Quality of Life of Patients with Heart Disease

Author(s): Grace Louis
Department: Other
Faculty Mentor(s): Sheila Barrett
Session Time: Session 4

The purpose of this research is to assess the methods in which doctors treat patients with heart problems and the point at which they determine that surgery is needed. The major focus of the research is to compare and contrast the quality of life between patients who have had open-heart surgery and patients who have pursued other treatment options. This research is necessary to help cardiac patients maximize their quality of life by being given the best possible treatment. Majority of the research will be done through interviews. The goal is to find a population of cardiac patients of all ages, ethnicities, and genders, some of whom have had open-heart surgery and some who have pursued other treatment options. In the interview, quality of life will be assessed using the Activities of Daily Living (ADL) validated questionnaire, and subjects will also respond to a Depression Scale.

53 Kelli Kohlstedt

What's the Rush? Exploring Emerging Adult Beliefs about Commitment in Couple Relationships and Marriage Postponement

Author(s): Kelli Kohlstedt
Department: Family, Consumer and Nutrition Sciences
Faculty Mentor(s): Dr. D. Scott Sibley
Session Time: Session 3

Emerging adulthood (the life period between 18-29 years old; Arnett, 2014) is a time of life characterized by decision making in romantic relationships (e.g., Fincham, & Cui, 2010). The purpose of this study was to explore how emerging adults (18-29 years old) have personally constructed their definitions of commitment in romantic relationships and why emerging adults believe that many are postponing marriage. Twenty (10 men, 10 women) unmarried emerging adults at a large Midwestern university participated and data was collected through intensive interviewing. Fifty-five percent of the
participants were currently in a romantic relationship (10 with opposite-sex partners, 1 with a same sex partner). Eighty-five percent of the participants indicated that they had previously been in a romantic relationship. Constructivist grounded theory (Charmaz, 2014) was employed to analyze the data. Themes were organized into two categories, and each category consisted of three unique themes. The first category was how emerging adults have constructed their understanding of commitment, and included the following themes: complete loyalty, investment in the relationship, and parental influence. The second category was the postponement of marriage, and this category contained the themes: fear of making the wrong decision, uncertainty about the future, and the norm of cohabitation. These results extend our knowledge about how emerging adults develop their personal definitions of commitment in couple relationships and highlight some factors that may lead to the postponement of marriage. This study has important implications for educators, researchers and clinicians that work with the emerging adult population.

54 Jessie Brucki
“We’re Just Talking”; Constructing a New Trend in Emerging Adult Romantic Relationship Development

Author(s): Jessie Brucki, Jessie Brucki, Kelsey Goodwin, Laura Hill, Keilene McCants, Lauren Slivinski, Scott Sibley
Department: Family, Consumer and Nutrition Sciences
Faculty Mentor(s): Scott Sibley
Session Time: Session 2

As many scholars have written (e.g., Arnett, 2014; Fincham, & Cui, 2011; Rogers, Willoughby, & Nelson, 2016), emerging adulthood is a time of life characterized by decision making in romantic relationships. The formation of relationships has changed in recent years as technology (smartphones, social media) is facilitating the communication between potential romantic partners which has changed the dating landscape. The current study consisted of eight focus groups (4 men focus groups, and 4 women focus groups) conducted at two different large, mid-western universities. Focus groups were conducted according to guidelines by Krueger and Casey (2009) with 43 emerging adults (21 females, 22 males). Each focus group discussed the recent trend of “just talking” and how it pertains to romantic relationship formation during emerging adulthood. Data was analyzed using the constructivist grounded theory approach (Charmaz, 2014), which is powerful method for researching change within social groups (Morse et al., 2009). This approach fit well with our goals of understanding this new aspect of emerging adult romantic relationship formation “just talking” among the specific social cohort of emerging adults. Through the steps of qualitative analysis 12 unique themes emerged in the data. Through the themes that emerged, we found that the “just talking” pathway to relationship formation in emerging adults is heavily rooted in ambivalence, confusing, and the use of technology. Most research has focused on hooking up and “friends with benefits” without examining the process facilitating these interactions. This study has important implications for educators, researchers and clinicians.
55  **Emili Mikolajczyk**  
*Investigating the disparity of employment opportunities of individuals with disabilities*

Author(s): Emili Mikolajczyk  
Department: Allied Health and Communicative Disorders  
Faculty Mentor(s): Matthew Sprong  
Session Time: Session 4

This study examines Human Resource Managers (HRM) involved in the hiring process and the idea of disability discrimination while looking at a resume of an individual with a disability. HRM will receive a job description, an applicant resume (either male or female), and an interview summary and they must determine whether or not they would hire the individual. After deciding, participants will complete a survey asking them how qualified they felt the applicant was for the job, the potential starting pay for this individual, and personal questions such as their knowledge of the Americans with Disabilities Act (ADA). The experiment will attempt to prove that there is a discrimination towards individuals with disabilities in the workplace and a lack of knowledge of the ADA. Another aspect being observed at is the idea of Double Jeopardy, if being disabled and a female will lessen the chances of you getting hired for the position. After completing this study, we hope to close the gap between disabled and non-disabled people that are getting hired and raise awareness of the act that is in place to keep discrimination out of the hiring process, as well as the idea of gender bias in the workplace.

56  **Rachel Watts**  
*An Exploration of Bias Towards Individuals with Psychiatric Disabilities in Healthcare Settings*

Author(s): Rachel Watts  
Department: School of Allied Health and Communicative Disorders  
Faculty Mentor(s): Amanda McCarthy  
Session Time: Session 1

This study examined future healthcare professional's bias towards mental illness. This study examined the introduction to occupational therapy class at Northern Illinois University. The study randomly assigned vignettes to the participants, one being the control and the other examining mental illness. The only difference between the vignettes was that one implied a mental illness well the other did not. The participants were then asked a series of questions, based on a Likert Scale, in which they were asked how comfortable they would be in situations and encounters with this individual. Results indicated that future healthcare professionals do have a bias towards individuals with mental illnesses.
Essential oil is considered to be a type of eastern medication, in which oil is extracted from a plant and used as natural remedies for certain chronic illnesses, such as stress. This type of medication is called aromatherapy. Although this can be a controversial topic, essential oils have proved to act as a strong agent in the reduction of anxiety. Using the essential oils as a natural remedy is crucial, since our dependence on over-the-counter medicines represents how out of touch we are with nature. Integrating the essential oil usage in comparison to prescription medication to our lifestyle is vital, since it is examined to be a lifesaver to many health problems, not only stress. The results for the experimental study for this project would be after some participants use the de-stress oil while performing a provided task, compared to other participants performing the same task without the usage of the de-stress oil.
58 James Mogan

*Exploring the Relationships Between Stressors and Behavior in Captive and Wild Sifakas*

Author(s): James Mogan  
Department: Anthropology  
Faculty Mentor(s): Mitch Irwin  
Session Time: Session 3

The “stress response,” or how an animal responses to external stressors, transpires from a litany of external factors. Such factors can include social relationships, ecological reasons including diet, or environmental reasons like habitat depletion (Beehner and Bergman, 2017). Past studies have focused on either captive sifakas or wild sifakas, without making a direct comparison between these two groups. By using total biomass (kg)/home range (m2) as a measure for competitiveness, behavioral data was gathered over the course of 17 days at the Tsinjoarivo Forest (19°4 0.940S, 47°45.460E; 1,590 m) of Madagascar and the Duke Lemur Center (Durham, NC) to assess behavioral differences between less competitive and more competitive breeding pairs of sifakas (i.e. smaller and larger groups) both in the wild and captivity to determine how competitiveness and sex influence behavior. The hypotheses of this study are 1) that given the stress of captivity and a reduced home range, the captive sifakas will exhibit more variation in their daily activity budget (i.e. their day will consist of many frequently changing, shorter behavioral events), 2) due to the added responsibility of being the dominant members of the group and nursing offspring, the females will exhibit a more varied activity budget than males and 3) more competitive groups will display a more varied activity budget than less competitive groups. This study could elucidate a potential scale for rating sifaka health and the degree to which institutions are caring for these animals.

59 Alexa Blair

*Code-switching Among English- and Spanish-speaking Individuals*

Author(s): Alexa Blair  
Department: Anthropology  
Faculty Mentor(s): Giovanni Bennardo  
Session Time: Session 2

The topics to be covered in this project will be how personal identity and language proficiency interact with each other, and how this affects instances of code-switching among English- and Spanish-speaking individuals. This review expects to find that older generations will code-switch more, out of lack of proficiency, than their younger counterparts. Differences in the frequency, such as how often in one sentence or over the course of 15 minutes, of code-switching between genders will also be more present in the first generation than in the second. However, code-switching will be just as prevalent in both generations, due to occasions of code-switching presenting themselves very commonly in conversations between individuals that speak at least two similar languages with each other.
In the summer of 2017 I had the opportunity to go to Peru with archaeologist Dr. Kurt Rademaker with the help of the Student Engagement Fund. While in Peru, I worked alongside Dr. Rademaker and other students from universities in the United States, Canada, and Germany. Our team excavated Paleoindian sites on the coast of southern Peru that are currently being threatened by destruction. I learned field methods including excavation, spatial mapping of artifacts and burials, sediment sorting and materials recovery, and cataloguing. We documented the sites Quebrada Jaguay (QJ) 16, 17, and 280, and Pampa Colorada (PC) 343. The goals for this project were to investigate Paleoindian settlement systems and the links between specific ecological zones. To do this we focused on local adaptations and the resources shared between highland and coastal environments. Some of the sub-goals were to investigate seasonality and to determine the extent of damage at one of South America’s earliest sites (Quebrada Jaguay). In this poster, I will share our findings, how they relate to Peruvian prehistory, and demonstrate the conservation of archaeological sites.

Grooming can remove dirt, pathogens and parasites, as well as reposition body parts. Grooming was compared among three species of parasitic wasp belonging to the Pteromalidae family. Parasitic wasps are important in helping control pests such as house flies. Thus, these wasps may encounter pesticides, and grooming may assist in removal of pesticide and help their survival. Only females were observed. To encourage grooming, the wasps were dusted with chalk. There were some differences in grooming pattern among species. For example, to groom their ventral abdomen, Spalangia endius used part of their hind legs, whereas Muscidifurax raptor used more of their hind legs. Muscidifurax raptor used both hind legs to groom one wing at a time, but the other species used one hind leg. In all three species, bidirectional rubbing between middle and hind leg was observed. This was something that had not previously been seen for Chalcidoidea, the superfamily to which Pteromalidae belongs. Future studies should test whether grooming patterns differ between sexes and how sex differences compare among species. Because burrowing is more frequent with females, they are predicted to groom their dorsal surface more often than males. Because Spalangia endius females brush their back with their hind legs during mating, they are predicted to reach more dorsal area than the other species.
The purpose of this poster is to explain the process by which a completed grass plastome (chloroplast genome) is created. The research will focus on six steps in plastome assembly. De Bruijn graph assembly is used to assemble contigs (contiguous sequences). Anchored conserved region extension orders contigs and locates errors from the assembly. In-silico genome walking is how researchers fill the gaps between contigs. Verification is used to find errors. Final assembly and annotation is when important features of the genome are labeled. After these steps the plastome is completed. Complete plastomes were assembled and compared for 11 species of grasses and several notable differences were found. A gene known as rpoC1 possessed a large intron in only one species. An area known as trnI to trnL gap possesses many different conformations despite the conserved nature of the area. The plastome can then be made publicly available to be used in comparing multiple completed plastomes created in the same way to reveal understandings about how DNA changes between species, genera, and families of organisms.

The purpose of the dissection of the human heart is to gain an in-depth knowledge of the structures located inside, as this is an organ of great importance in the study of anatomy. The expected results of this project are to successfully complete a full dissection of the heart so that each structure remains intact and identifiable. A variety of unique dissection techniques will be used in order to produce the most precise images of the anatomical structures within the heart.
Genotoxicity (DNA damage) was studied in normal human astrocytes (NHA) with computed tomography (CT). Various forms of radiation were utilized for genotoxicity comparisons. This project employs confocal laser scanning microscope (CLSM) to image a marker for radiation-induced DNA double strand breaks called $\gamma$H2AX foci, to determine genotoxicity (Nikolova et al., 2014). We will compare DNA damage from a prototype proton computerized tomography (pCT) setup with X-ray CT and a conventional photon source of radiation, 137Cs gamma rays. To simulate patient irradiation, a tissue equivalent pediatric head phantom will be used to place the cells in during exposures to radiation. It is proposed that the outcome from this study will rule out any untoward effects from radiation delivered during pCT irradiation. These results provide the basis for understanding basic mechanisms in the cellular processing of radiation-induced DNA damage in cells. Comparison of DNA double strand breaks will be analyzed to understand changes in the DNA damage response in cancer cells versus normal cells. The particular type of cancer involved is glioblastoma multiforme (GBM). GBM is a deadly form of brain cancer that leads to death in most cases. The demand for improved treatments increases as more people are diagnosed with GBM. By observing genotoxicity in GBM cells after radiation therapy, a better understanding will contribute to more effective treatments.

Fire and grazing are natural historic disturbances in tallgrass prairies and are often used by managers in prairie restorations to maintain biodiversity. Fire and grazing also play important roles in nutrient cycling and can influence both aboveground biomass and soil structure. We investigated how fire and grazing influence soil nitrogen content and nitrogen content in standing plant biomass of restored prairies where bison have been reintroduced. Fire and grazers both increased soil nitrate but decreased soil ammonia. Mean plant biomass of Andropogon gerardii was positively correlated with soil nitrate. These results suggest that prescribed fire and grazers can influence plant nutrient status via changes in soil conditions.
66 Oscar Martinez  
_The Effects of Seabird Guano and Community Composition on Algal Growth and Nutrient Uptake_

Author(s): Oscar Martinez, Lyndsay Rankin  
Department: Biological Sciences  
Faculty Mentor(s): Holly Jones  
Session Time: Session 3

Seabirds are essential in maintaining ecosystem function on islands where they nest through the deposition of nutrient-rich guano. These islands are threatened by invasive mammals, which are the primary cause of seabird deaths. Many islands have gone through invasive mammal eradication, resulting in the recovery of the terrestrial system (i.e. soil and plants). Islands with higher seabird populations (never invaded or eradicated) transport more guano into the near shore environment, promoting macroalgae species diversity and nitrogen levels. However, there is a gap in the research where macroalgae growth and nutrient uptake is quantified in systems varying by community composition and nutrient deposition, such as those found around islands at different stages of recovery. This study aimed to assess macroalgae response to differing levels of nutrient deposition and species richness in a controlled lab environment. Multiple aquaria were tested with differing levels of guano (low vs high) applied to various algae communities: monoculture of brown algae; mixed brown and red algae; and combined brown, red, and green algae. Ammonia, nitrate, and phosphate concentrations were measured at set time intervals following guano application. Results showed the communities with red and green algae had the lowest ammonia levels. Two weeks following guano application, the brown algae aquaria had the most nutrient-craving microalgae and the three-species aquaria had the least. The results confirm that red and green algae can take up nutrients faster than brown algae, which helps to explain the macroalgae diversity and nutrient levels observed at recovering seabird islands.

67 Stephanie Del Rosario  
_Biodegradation of LDPE Plastic Bags by Exiguobacterium Roc37 and the Fungus 16EI2_

Author(s): Stephanie Del Rosario, Jason Gramling, Scott Grayburn  
Department: Biological Sciences  
Faculty Mentor(s): Scott Grayburn  
Session Time: Session 2

Plastic in oceans has become a huge problem in the environment. In fact, 275 million metric tons of plastic was produced in 2010. Even more recently, concentrations have reached 580,000 pieces of plastic per kilometer of ocean. In turn, this has heavily impacted the marine life in oceans. Between 2012 and 2013, 18.2% of large fish caught in the Mediterranean Sea for consumption by humans had plastic pieces in their gut.

LDPE plastic is used for bags and films, and is an abundant pollutant in the environment. A local strain of fungus referred to as 16EI2 was able to use LDPE from a plastic bag as its only carbon source when grown in minimal media. The bacterium Exiguobacterium Roc37 could also use a piece of plastic bag as its sole carbon source. Both organisms, Roc37 and 16EI2, also exhibited growth using ethylene glycol as a carbon source. This chemical is produced after microbial colonization of LDPE plastic.
Growth studies demonstrated loss of LDPE mass following microbial growth. Induction of spore germination in 16E12 by sugar dramatically increased fungal colonization of plastic. This may result in a new approach for removal of plastic pollutants from the environment.

68 Nicole Wagner

Analyzing Impacts of Bison Wallows on Prairie Plant Communities

Author(s): Nicole Wagner
Department: Biological Sciences
Faculty Mentor(s): Nick Barber, Holly Jones
Session Time: Session 1

Bison are important in maintaining prairie communities through natural disturbance by trampling, grazing, and wallowing which helps shape prairie plant communities. Wallowing can aid prairie communities through seed dispersal and soil enrichment, increasing plant species diversity. The research was carried out at Nachusa Grasslands, where plants in and around active and abandoned wallows were surveyed to determine: (1) How wallowing changes communities and soil conditions compared to surrounding areas, (2) if plant and soil conditions return to their previous state after being abandoned. Active and abandoned wallows previously GPS located were used in surveying plots using 1m² quadrats within wallows, along wallow edges and in the surrounding prairie to identify plants, and quantify species richness, percent cover, non-native species abundance and Shannon Diversity. Due to increase in bare ground from soil compaction in wallowed sites, my predictions included an increase in plant species diversity and less richness compared to the surrounding prairie. I also predicted that abandoned wallows had higher diversity, as they returned to their natural condition. A larger amount of plant species richness and higher diversity may also be present in the surrounding prairie, compared to both abandoned and active wallowed locations.

69 Jeffrey Heise

Floral and Soil Stoichiometric Response to Prescribed Fire on the Tallgrass Prairie

Author(s): Jeffrey Heise, Holly Jones
Department: Biological Sciences
Faculty Mentor(s): Holly Jones, Nick Barber
Session Time: Session 1

Prescribed annual burns have long been used in remnant and restored prairies to boost nutrient cycling and control unwanted species. Moreover, prairie grazers tend to prefer recently-burned sites, which is often termed pyric herbivory. Plant and soil stoichiometry, specifically C:N, can be used to quantify the quality of the resource for grazers (plants) and microbes (soils). While the impacts of fires on soil and plant stoichiometry are known in old field prairies, little research has been done in more recently-restored ecosystems, especially those with newly-reintroduced grazers. This study examined how prescribed burns have affected plant community composition and plant and soil stoichiometry (C:N). We used matched pairs of burned and unburned sites with similar restoration ages. The first pair were restored in 2007 and 2008, and the second pair were restored in 2001 and 2002. Three soil samples and
55 plant samples were taken from each planting. Soil samples were sieved and analyzed for total carbon and nitrogen using a mass spectrometer. Three individuals of each plant species were collected, dried, homogenized, and also analyzed for total carbon and nitrogen. Data were analyzed using general linear mixed models. The data show a significant decrease in the C:N ratio for C4 grasses after prescribed fire, which is due to their capacity for late season growth and bloom. The C:N ratio for C3 forbs increased, indicating a lower quality resource. C3 grasses, legumes, and soil showed no significant change.

70 Alisha Blake

*Preparation of High Molecular Weight DNA from Zygnema circumcarinatum for Sequencing*

Author(s): Alisha Blake, Xuehuan Feng, Yanbin Yin, Scott Grayburn
Department: Biological Sciences
Faculty Mentor(s): Scott Grayburn
Session Time: Session 2

The fresh water alga *Zygnema circumcarinatum* is a direct ancestor of land plants. This species is an intermediate between other multicellular algae such as Klebsormidium, and liverwort, a primitive land plant. *Zygnema* was chosen for DNA sequencing of its entire genome. This information will provide clues about the evolution of plant cell walls and the transition from an aquatic environment to land. Cell walls from plants can be used as renewable biofuels and are components of foods consumed by humans and other animals. Cell walls also help to protect plants from pathogens and predators. Modern sequencing techniques require large amounts of purified, high molecular weight DNA. *Zygnema* secretes gelatinous material and produces slimy sheaths. The outer layer of the cell wall is composed of mucous. These polysaccharides interfere with DNA purification. Current research is focused on obtaining high molecular weight DNA with minimum contamination. The current DNA isolation method is based on a combination of three different procedures. Initial stages of the isolation were originally used with the seaweed *Porphyra perforata*, which also contains many polysaccharides. Other methods to dissolve polysaccharides in alcohol and salt water were incorporated into the current procedure. An overview of the procedure, from algae culture to gel analysis of DNA, is presented.

71 Pablo Nava

*Algae Viruses Isolated from the NIU Lagoon*

Author(s): Pablo Nava, Caitlyn Klein, Scott Grayburn
Department: Biological Sciences
Faculty Mentor(s): Scott Grayburn
Session Time: Session 3

Freshwater algae viruses were collected and independently isolated from the NIU lagoon. Though these five viruses are new to science, they appear to group in the phycodnaviridae based on our polymerase chain reaction (PCR) experiments. Previously, four lagoon viruses were shown to be closely related. A new virus was isolated through a series of plaque assays. These five viruses were then studied together and compared to PBCV-1. PBCV-1 was used in this study because it is a well-known freshwater algae virus that has a complete DNA sequence available. PCR primers were based on the PBCV-1 sequence.
Some of these viruses may be the same, which is one of the purposes of these experiments. We used PCR to identify whether PBCV-1 primers for DNA ligase and several chitinase genes amplified DNA from lagoon viruses. Additional primers based on non-coding sequences were also tested. Our results indicated that most primers based on gene sequences were conserved for all the algae viruses, which showed a high similarity between PBCV-1 and the lagoon viruses. Other primers showed differences between viruses. Our findings give us a better understanding of the diversity of algae viruses in the NIU lagoon.

72 Emily Fiala  
*Inhibiting IspE in the non-mevalonate pathway*

Author(s): Emily Fiala, James Horn, Katarzyna Hoerchler, Brian Hartnett  
Department: Chemistry and Biochemistry  
Faculty Mentor(s): James Horn  
Session Time: Session 4

The Horn Lab group has been targeting the enzyme IspE in the non-mevalonate pathway with the hope of inhibiting the enzyme. Inhibition of this enzyme prevents the production of isoprenoids, which are important compounds for many biological functions. The non-mevalonate pathway is an especially important target due to its prevalence in many bacteria and parasites, such as Malaria, and its absence in the human body. Inhibiting this pathway could lead to a potential cure for Malaria without harming the human body. To target IspE, differential scanning fluorimetry (DSF) tests were run to find the optimal conditions of protein unfolding. Once the optimal conditions were established, compounds from the Hagen lab group were tested using DSF against the enzyme to examine any potential inhibitors. Although only four compounds have been tested thus far, results indicate very good potential for inhibition.

73 Mark Banovetz  
*Pulling With a Purpose: Using a String-Pulling Task to Evaluate the Effects of Latent Immunotherapy on the MCAO Rodent Model of Stroke*

Author(s): Mark Banovetz  
Department: Biological Sciences  
Faculty Mentor(s): Douglas Wallace  
Session Time: Session 2

Stroke is one of the leading causes of disability in the United States, often resulting in long term disruptions of fine motor control. Currently, there is a significant lack of existing treatments for stroke, and moreover, no method currently exists to restore cerebral tissues that have been damaged by stroke. The current study evaluated the effectiveness of delayed administration of Anti-NOG-A antibody immunotherapy (11C7) as treatment intervention for the Middle Cerebral Artery Occlusion (MCAO) stroke model in rats. A string-pulling task was used in order to evaluate fine motor control between groups. Rats received 4 trials per week for 6 weeks, and video recording was performed for each trial. Topographic and kinematic organization of fine motor control was then analyzed via motion-tracking
software. Data collection is currently ongoing. The results of this study will evaluate the effectiveness of delayed treatment on performance in the string-pulling task. In addition, this work will further examine the efficacy of immunotherapy to promote neuroplasticity in rodent models of stroke.

74  Rebecca Maas

*Autophagic Flux in Glioblastoma Cancer Stem Cells Regulates Tumor Recurrence*

Author(s): Rebecca Maas, Courtney Feltes, Jessica Cox, Brandon Sklavanitis, Linda Yasui
Department: Biological Sciences
Faculty Mentor(s): Linda Yasui
Session Time: Session 3

Glioblastoma multiforme (GBM) is an extremely malignant form of brain cancer that is treated with surgery, chemotherapy, and radiation. Even with these extensive and invasive treatments, the mean survival time is only 14.2 months. The main characteristic of glioblastomas blamed for this short survival is the tumor’s almost universal recurrence. The strong link between glioblastoma cancer stem cells and recurrence has been evident through research. The cancer stem cells (CSCs) have the ability to reform the tumor very quickly and are also resistant to radiation therapy. However, autophagy, a lysosomal degradation pathway, has been identified as a good candidate for treatment of GBM, in particular GBM CSCs. Targeting autophagic flux can remove support for sustenance of CSCs and thereby remove the CSCs that are responsible for recurrence. Optimally, this strategy would decrease or eliminate tumor recurrence and increase the survival rate of patients. This research is vital to the patients diagnosed with glioblastomas and their families. This cancer is unlike others because of how aggressive and swift the tumor grows. So, by completing this research we hope to contribute to the creation of a better treatment, and someday a cure, for glioblastomas.

75  Tanner Yohe

*The Development and Use of dbCAN-seq and dbCAN-meta*

Author(s): Tanner Yohe, Huang L Wu P, Entwistle S Li X, Yi H Busk P, Xu Y Yin Y
Department: Biological Sciences
Faculty Mentor(s): Yanbin Yin
Session Time: Session 1

In our lab we are focused on creating new bioinformatics tools for genomic research. The two tools presented in this poster are dbCAN-seq and dbCAN-meta. DbCAN-seq and dbCAN-meta are two websites that are concerned with the genomic data mining of Carbohydrate Active Enzymes (CAZymes). The identification of CAZymes is a highly sought after utility, which has significance in bioenergy research and human disease research. The goal of dbCAN-seq was to create a database of computationally predicted CAZymes in over 5,000 fully sequenced bacterial genomes. This database not only includes genes annotated as CAZymes, but also comprehensive annotation data on these genes, including transmembrane regions, signature domains, signal peptide locations, and other data. This database provides a novel reference for users interested in the CAZyme composition in bacterial
genomes. While dbCAN-seq is a pre-annotated database, dbCAN-meta is a webserver, which allows users to upload their own genome sequences for predicting CAZymes. This allows users to receive computationally annotated CAZymes in a matter of minutes via a suite of tools and databases. DbCAN-meta not only finds CAZymes, but also discovers CAZyme Gene Clusters (GCGs) and creates visualizations for signature domains along with visualizations for GCGs. This is a highly unique service that combines the speed of modern computing and the accuracy of aggregated data collection to provide users a service for automated CAZyme data mining.

Publications:

76 Brian Osei-Badu

Ring Expansion of Substituted Cyclopropane Substrates

Author(s): Brian Osei-Badu
Department: Chemistry and Biochemistry
Faculty Mentor(s): Douglas Klumpp
Session Time: Session 2

The purpose of this project was to explore new synthetic organic chemistry. Previously, our research group showed that cyclopropane derivatives were able to undergo novel chemical reactions in acidic solution (J. Org. Chem., 2013, 78, 8922–8926). Based on these results, we hypothesized that some common cyclopropane compounds might react in a similar manner. This includes ethyl chrysanthemate (a fragrance chemical) and permethrin (a pesticide).

To test this hypothesis, ethyl chrysanthemate and permethrin cyclization were reacted in acid with aromatic substrates. Both sulfuric acid and triflic acid were used as the acid promoters. Good conversions were observed with p-dimethoxybenzene and p-xylene aromatic compounds, as unusual cyclization products were obtained. Other experiments sought carryout cyclization reactions with alkenes and various catalysts. The results of these studies will be presented.
This survey is intended to help discover and understand lab safety from an NIU student's perspective. Safety can be easily overlooked. But, with proper guidance, a trained eye, and practice in noticing the hazards and risks, NIU can find and correct many common mistakes in a laboratory setting to prevent illness or injury.

Nucleic acids are essential biomarkers for variety of purposes from monitoring food quality to medical diagnostics to applications in life-science research. While there is a diversity of techniques for the detection of nucleic acids, their quantitation is still an issue. The golden standard of oligonucleotide quantitation, quantitative PCR (qPCR), does provide information on nucleic acid amounts but is expensive, time consuming, and requires special instrumentation. Other established approaches (i.e. microarrays, fluorescent barcodes, in-situ hybridizations) are less reliable when it comes to quantitative information since require a calibration and well-characterized target standard. The goal of this project is to develop a way to quantify nucleic acids without calibration. In order to do it we generate the target concentration-dependent response profile and use its position as an indicator of target amount. In order to impose the capability, we develop a target-ligand binding model based on mechanism for negative cooperativity. In the binding model, two probes with similar binding affinities are designed to bind a target. By the design, the target can bind the two probes separately or simultaneously; however, the binding of one probe decreases the target’s affinity towards another (negative cooperativity effect). As a result, when an unknown amount of target is assessed against various amounts of probes present in equimolar amounts, the resulting response profile is a sigmoid curve with position of inflection point indicative of the target amounts. We assessed the approach’s capabilities to quantify a nucleic acid target over a concentration range exceeding two orders of magnitude and obtained accurate quantitative results. As a result, we established a new effective approach for the quantitative analysis of oligonucleotides that eliminates calibration and standard. The approach will find utility in variety of routine diagnostic applications.
Computational Investigation of a Cerium Oxysulfide.

Author(s): Cory Bork
Department: Chemistry and Biochemistry
Faculty Mentor(s): Chong Zheng
Session Time: Session 1

Band structures are two dimensional representations of the allowed energy levels of a solid material. Band structures can quickly reveal whether a solid material is metallic, semi metallic, or an insulator. The crystalline solid that is under investigation is a Cerium Iron Tungsten Oxysulfide hexagonal crystal. Wien2k, a computational program that uses Density Functional Theory intandem with Linearized Augmented Plane Wave (LAPW) method to solve a many electron system was implemented. The program Wien2k constructed several density of states plots and a band structure plot.

Magnetically Active B10-enriched Nanoparticles for BNCT

Author(s): Megan Polz, Fatima Abi Ghaida, Narayan Hosmane
Department: Chemistry and Biochemistry
Faculty Mentor(s): Narayan Hosmane
Session Time: Session 2

A method to prepare boron-10 enriched silica coated iron oxide magnetic nanoparticles (MNPs) is studied to emphasize future progression of cancer treatment/research. Such a treatment will entail the conduction of the boron-10 enriched nanoparticles via an external magnet to the tumor site, and subsequent irradiation and absorption of a thermal neutron which generates enough destructive energy within the confines of one cell diameter (~8 µm). Multi-step laboratory experiments are conducted to synthesize these multidisciplinary compounds: 1) Iron oxide magnetic nanoparticles (MNPs) are synthesized via aqueous mixtures of Fe(II) and Fe(III) in basic medium under argon to produce the magnetic iron oxide nanoparticles. 2) The iron oxide MNPs will be doped with a protective, stable, and biologically compatible silica layer via the reaction of MNPs with tetraethoxysilane in basic medium. 3) The functionalization of the silica coated iron oxide MNPs with silylated B10-enriched carboranes. Such a respective order will set an ease of steps in experimentation procedure leading up to a finalized surface functionalized method. Procedures followed by 1, 2, and 3 will also be analyzed by chemical instrumental analysis as 1H, 11B, 13C, 29Si nuclear magnetic resonance (NMR), and transmission electron microscopy (TEM). Such methodology is conducted in hopes of a better product to conform with carborane-functionalized silica coated iron oxide magnetic nanoparticles.
81 Oreoluwa Agunloye

Development of Ultrasensitive Molecular System Based on Rational Control Over Folding Topography in DNA i-motifs

Author(s): Oreoluwa Agunloye, Irina Nesterova, Mrittika Debnath
Department: Chemistry and Biochemistry
Faculty Mentor(s): Irina Nesterova
Session Time: Session 3

Ultrasensitive response systems for real-time pH monitoring in biological media are essential for assessing many important biological functions. However, as of yet, there are no highly responsive pH-sensing systems that can precisely measure very small (nanomolar and below) changes in pH. In order to quantitate small changes, a sensing system with sharp response sensitivity is necessary; however, conventionally used sensor-target interactions do not naturally yield a switch-like response. Therefore, the development of ultrasensitive sensing systems requires the implementation of a mechanism capable of inducing one. DNA i-motifs are highly suitable for serving this purpose owing to their high stability, biocompatibility, and their ability to bind protons in a highly cooperative manner. i-motifs are intramolecular quadruplex structures mediated by cytidines forming thermodynamically stable hydrogen bonds with each other in the presence of protons. Hence, DNA-forming cytidine-rich strands respond to changes in pH by reversibly folding into quadruplex structures. Given that these transitions proceed with positive cooperativity, they yield ultrasensitive response towards changes in proton concentration. To develop an i-motif based sensing system with maximized response sensitivity, it is essential to maximize the number of binding sites while minimizing the formation of stable partially folded conformations. To accomplish this, we design structural modifications aimed to establish: (i) kinetic control elements that direct folding, a means of avoiding partially folded conformations, and (ii) increased number of binding sites by splitting the quadruplex into cooperatively folding fragments. Research is still ongoing on how best to molecularly engineer DNA i-motifs for optimum efficacy. Ultimately, the pH sensing system that will be based on the resulting structure is expected to use fluorescence resonance energy transfer (FRET) as a platform for signal transduction.

82 Eulalio Valadez

Studying the Physical Properties of Potential Medicinal Inhibitors Against Disease-Causing Bacteria

Author(s): Eulalio Valadez
Department: Chemistry and Biochemistry
Faculty Mentor(s): Timothy Hagen
Session Time: Session 1

There has been an overuse of antibiotics which has allowed many bacteria to develop resistance, an issue that could yield life-threatening results from minor wounds. New antibiotics are critically needed so humans will not revert to an era of medicinal ineffectiveness. The undesirable growth of harmful pathogenic microorganisms such as Mycobacterium tuberculosis and Plasmodium falciparum depends upon the non-mevalonate (MEP) pathway, a process that leads to the production of isoprenoids crucial
for cell membrane maintenance, hormones, and other important functions. The MEP pathway is a seven-step isoprenoid biosynthesis, and one of the focuses for this research is the enzyme 2-C-methyl-D-erythritol 2, 4 cyclodiphosphate synthase (IspF) involved in step five. The enzyme is targeted because creating a range of antimicrobial inhibitors will help in destroying the MEP pathway. Without the pathway, bacteria will not be able to proliferate especially those that create diseases such as malaria and tuberculosis. The pathway is also not present in humans so creating powerful inhibitors for the enzymes will not affect humans. Many inhibitors for IspF have been created in the Hagen laboratory so the objective of the semester is to analyze and study certain physical properties of synthesized IspF inhibitors using high-performance liquid chromatography (HPLC). Some of the inhibitors’ physical properties that will be studied are pKa, solubility, and partition coefficient.

83 Jodie Savage
*Optimizing the Design of a phosphor CCD X-ray camera*

Author(s): Jodie Savage  
Department: Chemistry and Biochemistry  
Faculty Mentor(s): Laurence Lurio, Elizabeth Gaillard, Laurence Lurio  
Session Time: Session 1

Creating a schematic of an X-ray detector, using a phosphor that was determined best to be Gd2SO4:Tb, which is then focused onto a detector which is going to be a CCD camera. Using the numerical aperture equation and lenses equations, it was determined that a traditional lens will not yield satisfactory resolution as part of an x-ray, fluorescence detector.

84 Reuben James
*ONE-POT ESTERIFICATION OF ALDEHYDES USING 1-HYDROSILATRANE REDUCING AGENT*

Author(s): Reuben James, Sharon Herlugson, Sami Varjosaari, Vladislav Skypai, Thomas Gilbert, Marc Adler  
Department: Chemistry and Biochemistry  
Faculty Mentor(s): Thomas Gilbert  
Session Time: Session 3

Using 1-hydrosilatrane allows for an easy one-pot synthesis for direct esterification of aldehydes under mild conditions. This is done by first reducing the aldehyde to an alcohol, and then acetic acid is used to form an ester from the alcohol. This is unusual and exciting, as most reducing agents interact with the carboxylic acid causing production of side products. Furthermore, 1-hydrosilatrane is inexpensive to synthesize, largely air- and water-stable, and does not producing any unsafe or environmentally harmful side-products as most other reducing agents do. The method shows good functional group tolerance, only proving unsuccessful with aldehydes containing strong electron donating groups. A variety of esters are obtained in yields of 24% – 92%.
Carbon coupling reactions are applicable to a wide range of functional groups to induce a reoccurring cycle, thus making them significant for bioanalytical chemistry. In this study, a Ni(II)-phenanthroline system is used to catalyze ion-molecule reactions between carboxylic acids and various acetates. Upon reacting, the kinetics of the C-C coupling reactions are also studied and observed.

Biological systems depend on one of two pathways for pyrimidine base synthesis in order to survive. Synthesis of pyrimidine bases can be done from scratch (DeNovo pathway) or by recycling materials (salvage pathway). Humans can synthesize bases through both, while bacteria can only use DeNovo pathway. Targeting DeNovo pathway is an ideal way to seize bacteria reproduction as humans can rely on salvage pathway. Conversion of N-carbamoylaspartate to L-dihydroorotate is catalyzed by dihydroorotase (DHO). Concentration of DHO in a biological sample can be determined by generating a calibration curve with LCMS and HPLC. LCMS was ran with a fructose shell column and HPLC used zwitterionic column. Calibration curve for LCMS had an R2 value of .99, although it did not have many data points. While HPLC had sufficient data points but an R2 value of .96 rendering a calibration curve that was not suitable for quantitative analysis. Once suitable calibration curves are developed the inhibition of DHO in biological samples can be observed.
Ryan Miller

Characterization of Ethoxzolamide and Ethoxzolamide Analogs as a Potential Inhibitors of MEP Pathway enzyme IspF from Burkholderia pseudomallei

Author(s): Ryan Miller, Dakota Grote, Sydney Watkins, Lauren Johnson, Timothy Hagen, James Horn
Department: Chemistry and Biochemistry
Faculty Mentor(s): James Horn
Session Time: Session 3

The Methylerythritol Phosphate (MEP) Pathway is an essential pathway used by plants, algae, and eubacteria for isoprenoid biosynthesis. This pathway is absent in mammals, making it an attractive target for potential anti-infective agents. Investigation of small molecule interactions with the fifth enzyme in the MEP Pathway, 2C-methyl-D-erythritol-2,4-cyclodiphosphate synthase (IspF), from Burkholderia pseudomallei and has identified Ethoxzolamide as a potential inhibitor. Thermal stability and binding studies, via Fluorescent Thermal Shift (FTS) and Isothermal Titration Calorimetry (ITC), respectively, were used to investigate the binding stoichiometry, affinity, as well as the underlying binding thermodynamics for Ethoxzolamide and several related analogs. FTS results show near ten degree shifts in melting temperature of B. pseudomallei IspF, suggesting that the sulfenamide analogs of Ethoxzolamide may bind stronger to B. pseudomallei IspF than Ethoxzolamide. ITC results suggest that Ethoxzolamide has a low micromolar dissociation constant with B. pseudomallei IspF. To evaluate enzyme inhibition, a plate-based inhibition assay, currently under development, will be used to examine the inhibition of Ethoxzolamide and its analogs. Further ITC experiments will be conducted to evaluate the binding thermodynamics of the sulfenamide analogs of Ethoxzolamide versus B. pseudomallei IspF.

Victoria Pho

Enzymatic Stabilization through Antibody Fragment Binding

Author(s): Victoria Pho, Devon Boland, Rebecca Rasmussen, Sriram Jakkaraju, James Horn
Department: Chemistry and Biochemistry
Faculty Mentor(s): James Horn
Session Time: Session 1

The usage of linkers in genetically engineered fusion proteins provides opportunities to introduce new functional properties beyond the simple linking together of two functional domains. Possible effects due to the linker may include altered biological activity, expression yield, and stability, thus opening new directions in potential medical or pharmaceutical applications. Previous research has shown an increase in thermal stability of bovine carbonic anhydrase (bCA), an enzyme that facilitates the interconversion between carbon dioxide and bicarbonate, when it bound to the anti-bCA camelid heavy chain antibody fragment, α-CA05-VHH. To further increase the stabilization of carbonic anhydrase, a linker has been introduced, genetically fusing bCA with the VHH antibody, creating the fusion protein α-CA-1x-CAVHH. Activity assays were used to characterize the fusion protein. Initial results suggested similar or an increase in bCA's enzymatic activity. Future plans include measuring the fusion protein’s stability using circular dichroism.
Jorge Nevarez

Effects of Introduced Linker and Point Mutations Within the Biotin-Binding Pocket of the Rhizavidin Protein Dimer

Author(s): Jorge Nevarez
Department: Chemistry and Biochemistry
Faculty Mentor(s): James Horn
Session Time: Session 2

Proteins in the avidin family are known for their exceptionally strong affinity to biotin (Kd ~ 10^{-14}-10^{-16} M). The high specificity and strength of interaction make avidin family proteins useful in various biological applications, such as cell imaging and affinity chromatography. Attempts have been made to create a monomeric avidin protein with a one-to-one binding stoichiometry. These monomers have largely exhibited decreased affinity for biotin and a decrease in thermal stability. Here, we have created a monovalent rhizavidin (scRhizM), through an alternate approach, with the hope of retaining high affinity binding and thermal stability. To determine the binding thermodynamics of scRhizM, the protein/ligand interaction was analyzed using isothermal titration calorimetry (ITC). These experiments revealed an apparent Kd value of 2x10^{-9} M and ∆H° value of -16 kcal/mol. As the apparent Kd value was at the limit of detection for ITC, displacement experiments were performed, which revealed Kd and ∆H° values of 2.5x10^{-11} M and -20 kcal/mol, respectively. These results suggest that the high affinity of rhizavidin-biotin interaction was retained in the scRhizM-biotin interaction. Further experiments are necessary to determine the thermal stability of scRhizM.

Jennivee Westfall

Metal Organic Frameworks

Author(s): Jennivee Westfall
Department: Chemistry and Biochemistry
Faculty Mentor(s): Chong Zheng
Session Time: Session 3

Current research is focused on the formation of metal organic frameworks (MOFs). The synthesis of the frameworks includes dissolving a lanthanide or transition metal salt and reacting it with some of the following compounds: bipyridine, oxopropanoyl(oxy)benzoic acid, 2,6-naphthalenedicarboxylic acid in the following solvents: dimethylacetamide, dimethylformamide, and dimethyl sulfoxide. The goal for this synthesis is to find the concentration of the compounds that forms pure crystalline structures. Reactions are heated to 100°C in Teflon-lined, stainless steel acid digestion vessels or placed in a hot silicon oil bath at 100°C for 48 hours under reflux. A novel europium metal-organic framework was successfully synthesized with 2,6-naphthalenedicarboxylic acid. The crystalline structures will be investigated to confirm structure. Methods of checking the crystalline purity include both single-crystal and powder XRD, and the presence of the ligand is further confirmed with FTIR spectroscopy. Electronic properties and potential chemical sensing applications are investigating using fluorescence spectroscopy.
91 Samantha Bacchi  
*Computational Study of Cyclic Zirconium Compounds*

Author(s): Samantha Bacchi  
Department: Chemistry and Biochemistry  
Faculty Mentor(s): Thomas Gilbert  
Session Time: Session 3

This computational chemistry modeling project investigated the stability of zirconium compounds formed through [4+2] cycloaddition reactions, similar to the Diels-Alder reaction, and through [2+2] cycloaddition reactions. The study employed the Gaussian 09 program for calculations through the WebMO interface. Optimizations of the molecules and frequency calculations were done using a BLYP/SDD and M11L/SDD model chemistries. The thermal correction to Gibbs Free Energy and the optimized energy values were recorded and used to calculate relative Gibbs Free Energy ($\Delta G$) values. It was found that the $\Delta G$ values were almost all exergonic, and the extent of this depended on the placement and number of methyl substituents and on the type of cycloaddition reaction.

92 Alyssa Mohr  
*Synthesis, Structure, and Electronic Configuration of a Multicomponent Photoelectric Material*

Author(s): Alyssa Mohr  
Department: Chemistry and Biochemistry  
Faculty Mentor(s): Chong Zheng  
Session Time: Session 1

Current solar energy converters, such as polycrystalline silicon panels, absorb a very limited portion of the incoming electromagnetic spectrum, with much of the light energy present not being transformed into electric energy. Our goal is to develop a multicomponent functional material containing unique elemental structures each able to absorb a different portion of the spectrum. Ideally, the material as a whole would convert all photoelectric energy into usable electric energy. To do this, a standard solvothermal process was used to synthesize a transition metal functional material with Ag(I) as the base unit. The crystal structure was obtained by using powder and single crystal X-ray diffractometers. Based on theoretical analysis, this semiconductor material has the capacity to absorb 2-3 different portions of the solar spectrum. Physical and chemical properties are being investigated for its photoelectric properties.
Molecular sensing systems capable of quantitating small changes in a target over much greater in magnitude backgrounds are appealing for many applications. In such situations, systems that produce sharp response over a small change in target (so called ultrasensitive systems) are essential for reliable quantitation. However, the design of a system with ultrasensitive response is not straightforward since the majority of target/ligand binding interactions yield so called convex response function. The convex function produces a wide (approx. 2 orders of magnitude) response range that does not allow quantifying small changes in target. In order to enable an ultrasensitive response, one needs to impose a special target/ligand binding mechanism. This project focuses on developing a novel sensing approach with ultrasensitive response capability based on nucleic acid i-motif. i-motifs bind protons with high cooperativity yielding ultrasensitive response. Besides, the sensing system is tunable toward unknown backgrounds. We demonstrate the capability of the system to measure very small changes in proton concentration on the example of detection of nanomolar concentrations of DNA polymerization events. A proton is a by-product of nucleotide incorporation during DNA polymerization; therefore, its detection is an indirect indicator of a successful polymerization event. In order to detect nanomolar changes in proton concentrations, the conditions must be buffer-less. Elimination of buffer introduces uncertainty of background. The tunable nature of nucleic acid scaffold allows tuning response range to the actual background. The work presented specifically focuses on establishing the actual response sensitivity of an i-motif based system via quantitation of actual number of released protons. The protons are indirectly quantified by establishing amounts of produced polymerized product. The sensing system will find utility as a new detection platform for point-of-care compatible DNA sequencing devices and as a way to monitor other biochemical events involving changes in proton concentration.

In this project, the program AutoDock was used to run various docking experiments. The docking experiments consisted of a sulfonamide inhibitor and an enzyme in the MEP pathway—the enzymes of interest specifically being IspF and IspE. Sulfonamides react potently with the active sites of these enzymes. The goal of this project was to design a molecule that inhibits one of the two enzymes in the
pathway by binding more potently than the natural substrate. The MEP pathway is a life-sustaining pathway used by many eubacteria. Inhibiting this pathway will result in cell death; thus, an inhibitor may be used as an antibacterial agent. This software has useful implications in drug discovery, as many drugs are enzyme inhibitors.

95  Zohra Sattar  
*Traditional Medicinal Plants: Exploring Old Solutions to Modern Health Crises through Natural Products Chemistry*

Author(s): Zohra Sattar, Margaret Miller, Fidensio Ndegwa, Debarati Ghose, R. Meganathan, Timothy Hagen, Zohra Sattar,  
Department: Chemistry and Biochemistry  
Faculty Mentor(s): Timothy Hagen  
Session Time: Session 3

Infections that are caused by drug resistant bacteria and malaria are serious threats to global health, and it is vital to discover new treatments. Traditional medicinal plants such as the seven plants analyzed in this experiment have been long employed in healthcare. In fact, many modern medications have their bases in natural products or have a natural product counterpart with comparable benefits. Examples include the cholesterol lowering agent Lovastatin from red yeast rice, the anticancer drug Taxol from the Pacific yew, penicillin from fungi, and the ibuprofen-like effectiveness of ginger in relieving severe menstrual cramps. Even the breakthrough antimalarial drug artemisinin was isolated from the plant Artemisia annua, the sweet wormwood herb used traditionally in China for centuries, winning Tu Youyou the 2015 Nobel Prize in medicine.

In this experiment, powdered stems, roots, bark, and leaves of traditional medicinal plants from Kenya were sequentially extracted with water, methanol, and hexane and non-sequentially with acetone, ensuring that compounds with a broad range of polarities were extracted from the plants. Extracts were tested for antimicrobial activity through zone of inhibition assays against P. aeruginosa, E. coli, M. smegmatis, and B. cereus at 0.2 mg/mL, 2.0 mg/mL, and 10.0 mg/mL, and the results will be presented.

96  Kylie Zawiszwa  
*Determining pH dependency of the interaction between maltose and maltose binding protein*

Author(s): Kylie Zawiszwa, Holly Norell, Alexander Miller, Devon Boland, James R. Horn  
Department: Chemistry and Biochemistry  
Faculty Mentor(s): James Horn  
Session Time: Session 1

Proteins are some of the most diverse molecules in biology. Their roles in the human body are very specific and depend on the three-dimensional structure resulting from the specific sequence of amino acids. Alterations in the protein's environment, such as changes in pH, temperature, or salt concentration, can alter the protein function. This project will study the influence of pH on the binding affinity between maltose binding protein (MBP) and its native ligand, maltodextrin, using isothermal
titration calorimetry. Due to the presence of the amino acid histidine in the binding interface of the maltose binding protein, it is hypothesized that the interaction will be pH-dependent. A better understanding of the maltose/MBP interaction will allow MBP to be used as a model antigen for antibody engineering efforts in the lab. In addition, understanding the mechanism of pH dependent maltose recognition will provide a more thorough picture of MBP’s physiological role.

97 Arthur Krasowski

*Isotopic Studies of Oxygen 18 Formation in Carbonate Minerals*

Author(s): Arthur Krasowski  
Department: Chemistry and Biochemistry  
Faculty Mentor(s): Lee Sunderlin  
Session Time: Session 1

Isotopes naturally exist in various abundances. The measurement of the ratio of isotopes has several applications such as paleoclimatology. The ratio of isotopes changes depending on environmental factors such as temperature. When a microorganism such as a coccolithophore dies, the ratio of oxygen-16 and oxygen-18 in its calcium carbonate shell becomes fixed as it becomes preserved in the sea bed. By determining the ratio of oxygen isotopes in seashells, it is possible to estimate the temperature the organisms lived in. One technique used to investigate the isotopic effects of oxygen is computational chemistry which uses computers and various methodologies to provide information such as the properties of molecules. This research involved the use of computational chemistry to calculate changes in frequencies of oxygen-16 and oxygen-18 in order to understand the effects on zero-point energy and to determine the role of entropy on the system. Materials Studio was used to perform CASTEP GGA/PBE geometry optimizations on carbonate minerals such as calcite, dolomite, and cristobalite which contained oxygen-16. After optimization, the vibrational frequencies, phonon dispersion and density of states were calculated using the same method and zero-point energies were obtained. This method was repeated after replacing oxygen-16 with oxygen-18 in each mineral, and the results were compared.

98 Marina Galluzzo

*Engineering pH-Based Control of an Anti-Hapten VHH/Hapten Interactions*

Author(s): Marina Galluzzo, Hyeyoung Eom, James Horn  
Department: Chemistry and Biochemistry  
Faculty Mentor(s): James Horn  
Session Time: Session 3

Antibodies are molecules of the immune system that possess high binding affinity and specificity for their specific target molecule. Beyond their physiological role, antibodies are also used in therapeutic and diagnostic applications. Structurally, antibodies can be reduced into smaller fragments that maintain the antigen binding domain, such as Fab Fragments and VHH camelid single domains. Here, an anti-caffeine VHH is used as a model to better understand how pH dependent target recognition may be engineered into an antibody-hapten interaction. Specifically, two independent histidine substitutions, Y108H and F49H, were introduced into the VHH/VHH interface as a route to link pH with caffeine/VHH
binding. The pH dependence of the binding affinity was determined using isothermal titration calorimetry. After examination via ITC, WT Anti-Caffeine VHH was roughly pH independent, while the mutants (Y108H, F49H) reveal pH dependence.

99  Kara Nehrkorn  
*Multicomponent Materials for Solar Energy Conversion: Ln3FeWO6S3*

Author(s): Kara Nehrkorn  
Department: Chemistry and Biochemistry  
Faculty Mentor(s): Chong Zheng  
Session Time: Session 3

Harvesting solar energy is one of the most important tasks for reducing greenhouse gas emission and sustainable energy production. Most materials used for this purpose, however, absorb only a narrow spectrum of the incoming solar radiation. Polycrystalline silicon which occupies approximately 55% of the world photovoltaics market, for example, has a band gap of about 1.1 eV, and it can utilize only 25% of the incoming solar power. For photocatalytic applications, the most widely use catalyst TiO2 has a band gap of 3.2 eV which is corresponding to the UV region of the solar spectrum. This region consists of only 5% of the incoming solar power.

One strategy to increase the absorption of solar spectrum is to engineer materials that have several components, each of which is capable of absorbing one region of the solar spectrum. By increasing the number of components, chemists hope to discover materials that can absorb the complete spectrum of the solar radiation, from infrared to ultraviolet.

In this research, we have synthesized a series of rare earth compounds Ln3FeWO6S3 (Ln = La, Ce, Pr, Nd). These isostructural solids consist of two units: The La3O6 trigonal prism which is of ionic character, therefore possessing larger energy gap and capable of absorbing shorter wavelengths of the solar spectrum; the FeS3 octahedron with covalent bonding, thus having smaller band gap and capable of absorbing longer wavelengths. I have purified one compound Ce3FeWO6S3 using various solvents, making the sample ready for photo absorption testing.

The structure of the compound from X-ray measurement, powder spectrum for purity confirmation, electron microscope imaging and energy dispersive spectrum for elemental analysis will be reported.
100  **Randy Lin**  
*Fighting AMR Infections Through Synthesis and Characterizations of Potential IspF inhibitors*

Author(s): Randy Lin, Amber Sayles, Sydney Watkins, Timothy J Hagen  
Department: Chemistry and Biochemistry  
Faculty Mentor(s): Timothy Hagen  
Session Time: Session 4

Microbes are becoming resistant to current treatments at an alarming rate. It has been estimated that by the year 2050 over 10 million people per year will die from antimicrobial resistant (AMR) infections. This will surpass the number of deaths caused by cancer. There is an urgent need to discover new medicines and therapies to treat AMR. A promising target to treat AMR is inhibition of methylerythritol pathway (MEP) enzymes. The MEP pathway is essential to most disease causing bacteria and the malarial parasite but it is not found in humans, which makes MEP inhibitors an attractive target for AMR infections. In particular, the IspF enzyme was used in this research, as it is one of the seven enzymes that can be inhibited in the MEP pathway. This poster will discuss the synthesis of potential IspF inhibitors based on sulfonamide derivatives and their characterization through 1H, 13C NMR, and HPLC analysis.

101  **Sherdenia Barbary**  
*Creating Boron-Nitrogen Based Cyclic Compounds to Combat Toxins in the Atmosphere*

Author(s): Sherdenia Barbary  
Department: Chemistry and Biochemistry  
Faculty Mentor(s): Thomas Gilbert  
Session Time: Session 1

Instead of using a carbon spine to interact with toxins in the air, Boron-Nitrogen compounds (with electron withdrawing groups on the Boron and electron donating groups on the Nitrogen) were computed and reacted with common air toxins such as Sulfur Dioxide (SO2) and Nitrite (NO2) to create nontoxic 4 member and 5 member rings.

The computational program used in this experiment was WebMO, the theories used were Hartree Fock, M06-2x, and M11 with the basis sets 6-31+G(d,p) and 6-311+G(d,p). With this program the potential compounds reaction energies, transition states, and activation energy barriers were found. Using this information, it could be determined whether the compound would be stable, form in the air. The 5 membered ring and the 4 membered rings with the central atom attached to either the Boron or Nitrogen were all compared with one another.

With the SO2 chemistry, it was determined that the 5 membered and 4 membered rings with the Sulfur attached to the Nitrogen of the B-N spine were stable, though only the 4 membered ring had an exothermic transition state (-30.5KJ/mol). The 4 membered cyclic ring with the Sulfur attached to the Boron of the B-N spine was highly endothermic with a larger activation energy barrier, so it would not form in the air.
Carboxylates of metal ions or complexes are known to undergo decarboxylation leading to organometallic species that can be utilized for multiple synthetic purposes. Recently, while studying the chemistry of Pd(II) complexes with carboxylates and an organophosphorus auxiliary ligand, we found that they, upon CID, undergo a novel decarbonylation reaction that is often competitive with decarboxylation. If the initial carboxylic acid contains a b-hydrogen atom, another fragmentation step results in an olefin elimination. This is a promising process, as carboxylic acids can be produced from bio-renewable sources and converted into olefins useful as starting materials for various applications.

If the carboxylic acid does not have a b-hydrogen atom in R (like in formic, acetic, or benzoic acids), reaction (1) competes with decarboxylation (2) and often outcompetes it. However, if a b-hydrogen atom is available in the R group (like in hydrocinnamic acid), a second CID step results in olefin elimination (3):

\[
\begin{align*}
[Pd\text{II}(dppm)(OOCR)]^+ &\rightarrow [Pd(dppm)(OR)]^++CO \quad (1) \\
[Pd\text{II}(dppm)(OOCR)]^+ &\rightarrow [Pd(dppm)R]^++CO_2 \quad (2) \\
[Pd(dppm)(O)CH_2CH_2R']^+ &\rightarrow [Pd(dppm)(OH)]^++CH_2=CHR' \quad (3)
\end{align*}
\]

A wide range of this class of carboxylic acids and different auxiliary ligands were tested and many underwent reactions (1) followed by (3). Some of the acids had fairly complex substituents, like the amino acid leucine or 4-(2,5-dimethoxyphenyl)butyric acid. This shows that the method can be used to produce highly functionalized alkenes.

Another interesting example is acrylic acid that has a b-hydrogen atom at the double bond. Reactions (1,3) of the ternary Pd acrylate complex resulted in alkyne production.

Some acids (like 4-bromocinnamic acid), however, underwent decarboxylation reaction (2) only instead of following the decarbonylation pathway (1).
explored to establish the optimal conditions necessary to produce the desired Li-BNNT. Consequently, the pyrolysis was carried out between the solid samples of LiF, NaN3 and B2O3 at 700Å° using a Magnesium catalyst. The products were then purified using hydrochloric acid and identified using transmission electron microscopy (TEM), Fourier-transform infrared spectroscopy (FT-IR), and energy-dispersive X-ray spectroscopy (EDX).

104 Stacy Schindlbeck
Further Characterization of the Binding Thermodynamics of Metal Cofactors to Burkholderia pseudomallei ispF

Author(s): Stacy Schindlbeck, Krystal T Do, Dakota L Grote, Timothy J Hagen, James R Horn
Department: Chemistry and Biochemistry
Faculty Mentor(s): James Horn
Session Time: Session 1

In characterizing 2C-Methyl-D,2,4-Cyclodiphosphate Synthase (IspF), the fifth enzyme in the Methylyerythritol Phosphate Pathway, the binding properties of the Zinc (II) metal ion cofactor can be explored using several methods. This specific metal cofactor is necessary for the catalytic function of the IspF enzyme. Using Isothermal Titration Calorimetry (ITC), the binding affinity for Zn2+ to the IspF enzyme can be determined. Previous experiments indicate an apparent high affinity causing difficulty in pinpointing an exact value when titrating just Zn2+ into a solution of IspF. A Fluorescent Thermal Shift Assay (FTS) was run with other 2+ metal ions, including Mg2+, Ni2+, and Cu2+, after stripping Burkholderia pseudomallei IspF of metals using EDTA. Using one of these ions as a substitute for the Zn2+ in the enzyme, competitive ITC can be run to better show how tightly the Zn2+ cofactor binds to IspF.

105 Hannah Tortorella
Planning to Get a Job: An Investigation of Planning Theory in the Context of Job Seeking

Author(s): Hannah Tortorella
Department: Communication
Faculty Mentor(s): Mary Henningsen
Session Time: Session 2

Job seeking is an important and complicated process. For students who are about to graduate or how are seeking jobs to help them pay for school, job seeking requires attention, energy, and planning. In this study, planning theory (Berger, 1997) is applied to the context of job interviewing communication. Participants completed measures of demographic information, job importance, goals, amount of planning, plan hierarchy, plan specificity, and plan contingencies. The results present comparisons of individuals who were offered the position they applied for and those who did not.
An experiment into the novel synthesizing magnetite (Fe3O4) nanoparticles. Two species of Iron Chloride, (II) and (III), were mixed in a solution of water and Polyoxyethylene sorbitan trioleate which acted as an emulsifying agent. This reaction solution was then reacted with a quantity of Ammonium Hydroxide and stirred for a short time frame. A phase of washing with 1:1 mixtures of distilled water and ethanol was followed by drying under a high vacuum line. Yields ranged from 20-80% collected however more importantly the qualitatively results showed nanoparticles, imaged with Transmission Electron Microscopy, were between 8 to 20 nanometers in diameter which were targeted values. Future applications of this work include the field of medicine. The need for new drug delivery agents in Boron Neutron Capture Therapy are met with the coating and functionalization of magnetic nanoparticles. Iron is preferred over alternative particles such as gadolinium due to the cost and nature of synthesis. Further study of these particles is needed including study of the intermediate formed between the Polyoxyethylene sorbitan trioleate and Iron Chlorides’ as well as formalizing study on the reaction mechanism and scheme.

The synthesis of xerogel silica materials had been conducted with the reactants of Ortho-Carborane, n-BuLi, variations of silica compounds; SiCl 4 , SiMeCl 3 , and SiMe 2 Cl 2 , and Isopropanol. Synthesis was also conducted using Para-Carborane, n-BuLi and SiCl 4 The o-carboranysilane was analyzed with 1 H, 11 B, 13 C, 29 Si NMR and the resultant hydrolyzed product was identified as being xerogel.

The p-carboranosilane was analyzed with 11 B, 13 C, 29 Si NMR and, established by the 11 B NMR, was identified as being a crude product of a silane-dimer with traces of leftover p-carborane, which was removed using a sublimation method.
108  Theresa Li
    Temporal Extension to Geospatial Quadtrees

    Author(s): Theresa Li
    Department: Computer Science
    Faculty Mentor(s): Kirk Duffin
    Session Time: Session 4

This research's purpose is to investigate a temporal extension to the geospatial data structure, region quadtrees. Specifically, we want to create a data structure to represent shapes that change over time. The importance of time-changing shapes is seen in people's memories of maps and how the level of detail is dependent on the observer's level of exposure. These maps in our mind change when we move to different places and have different experiences. In this research, we are utilizing past and present shapes of Illinois county boundary lines as a representative case. Our expected results include creating software that makes a data structure that can encapsulate time and be flexible to modifications.

109  Sharon Herlugson
    Improved Synthesis of 1-Hydrosilatrane and probing new applications

    Author(s): Sharon Herlugson, Reuben James, Vladislav Skrypai, Sami Varjosaari
    Department: Chemistry and Biochemistry
    Faculty Mentor(s): Thomas Gilbert, Marc Adler,
    Session Time: Session 3

1-Hydrosilatrane has been shown to be an efficient reducing agent. Due to its low cost, stability, and versatility, it has the potential to be a commodity chemical in the future. It has been found to be relatively simple to synthesize. To do this boric acid is heated under distillation with triethanolamine to synthesize boratrane. The boratrane is then mixed with triethoxysilane to synthesize 1-hydrosilatrane. However, there was still room for improvement to maximize efficiency. By running smaller batches, in maximum size round bottom flasks, and using tighter seals in the glass apparatus we were able to get higher yields and higher purity with no extra purification steps. 1-Hydrosilatrane was further tested as a reducing agent in one pot ester synthesis. Aldehydes were placed in a pot with 1-hydrosilatrane and acetic acid as a catalyst to form an ester. Varying degrees of success were found partially related to the presence on a withdrawing group on the aldehyde.
This project describes the composition of vegetation in rare groundwater spread springs in the Colorado National Monument. Springs are an important source of perennial water in the arid landscape. A high diversity of plants was found during field data collection with 66 Native, 20 Introduced species, and 5 species that were classified as both. This field data was used for the statistical analysis in this project. Locations that contain Agrostis gigantea have less native plant coverage in the site. A T-test taken between the amount of plant cover of native grasses in sites that contained Agrostis gigantea showed that there is a correlation between the amount of native grass cover and introduced grass cover in sites that had Agrostis gigantea. The biggest influence of introduced plant coverage of this site type is an introduced grass: Agrostis gigantea. Agrostis gigantea is an introduced perennial grass that is highly tolerant to fire. This means that prescribed burns would do little to combat growing population of the plant. This plant was also shown to be present in fourteen of the twenty-eight sites recorded in the project. This analysis is important in understanding the influence this species has on the area.

Diabetic Retinopathy (DR) and Age-related Macular Degeneration (AMD) are the most common ocular diseases and a leading cause of blindness in American adults. Laser treatments and drug intervention with Lucentis and Avastin are available for controlling angiogenesis by inhibiting the growth of new blood vessels. These antibody injections are given monthly into the eye which are inconvenient as well as very expensive. Our research focuses on encapsulating the protein drugs within the liposomes to obtain drug release over a longer period, thereby decreasing the frequency and cost of the injections. In vitro studies showed that liposomes can be used to deliver Avastin over a period of 6-8 months. Animal studies were conducted to corroborate the results, where a minimum effective dose was monitored over a period of 5 months. In order to extend the release, the liposomes were entrapped within biodegradable hydrogels as well as refillable drug depot implants, thereby extending the time of release. Overall, our research focuses on developing Avastin loaded liposomes for extended release drug delivery to treat ocular angiogenesis. In vitro biological activity, RPE cytotoxicity tests and animal experiments were conducted to determine the efficacy of the drug delivery system for potential human use.
Chicago introduced its energy benchmarking ordinance in 2013 with the hopes that building owners would become more aware of their energy performance and would be able to make cost saving improvements that would in turn reduce their overall energy consumption. Buildings over 50,000 square feet are required to report their energy usage to the city each year by using the Environmental Protection Agency’s Energy Star Portfolio Manager. By using publicly reported energy benchmarking data from 2014-2016, we can control for building size, type, and the year it was built to see if energy reporting does affect the level of energy usage. If so, this could be evidence that cities do not necessarily need to force restrictions on energy usage, but by having additional information, building owners can make their own informed decisions about their levels of energy consumption. These findings could provide encouragement for other cities to implement an energy benchmarking requirement as the first step in reducing their city’s overall energy consumption.

Human missions to Mars will likely occur within the next few decades, and it is essential to protect astronauts from solar radiation and meteorite bombardment that permeate through the relatively thin Martian atmosphere. Lava tubes on the Martian surface provide natural protection from these hazards, and topographic profile analysis can determine their potential for habitability.

The Mars Orbiter Laser Altimeter (MOLA) onboard the Mars Global Surveyor spacecraft was used to create a global map of the Martian surface; however this dataset provides elevations at a relatively low resolution of about 463 meters per pixel. Digital terrain models (DTMs) have recently been derived from stereo pair images taken by the HiRISE camera onboard the Mars Reconnaissance Orbiter (MRO) spacecraft. These images provide elevation at a resolution of 1-2 meters per pixel, but only cover a fraction of what is mapped by MOLA.

This study analyzes three suspected lava tubes, using the Java Mission-planning and Analysis for Remote Sensing (JMARS) geospatial information system. The HiRISE DTM and MOLA 128 ppd layers were used to identify the suspected lava tubes, and data from the JMARS program was used to create six topographic profiles, integrating both the HiRISE and MOLA datasets. Preliminary analysis shows average slopes of less than 0.25° for the floors of these tubes, and collapse features in each tube provide points of entry.
Many features in the HIRISE-derived topographic profiles are less clear in the MOLA-derived topographic profiles, illustrating the need for further high-resolution mapping of the Martian surface.

114 Cayli Mitchell  
*Nahua Women: The complimentary life of a women in the 16th century before and after Spanish conquest*  
Author(s): Cayli Mitchell  
Department: History  
Faculty Mentor(s): Kristin Huffine  
Session Time: Session 1

My research examines Nahua women, gender, and sexuality in pre-columbian and post-colonial Mexico. The study delineates women’s role, hierarchical position, and efforts of negotiation in work, religion, and the politics of daily life. It also investigates as much as the sources allow women’s sexuality within Nahua culture.

115 Olsi Shehu  
*Attention Span of an article*  
Author(s): Olsi Shehu  
Department: Computer Science  
Faculty Mentor(s): Hamed Alhoori  
Session Time: Session 3

In this project we are investigating why there are some scientific publications that receive a lot of attention in policy documents, news articles and on social media. We are also looking into how long those articles have a social impact for. We are also investigating how well the public will understand the scientific outcomes described in online news articles shared on other online platforms such as Facebook, Twitter etc. Lastly, we are trying to figure out what are the factors that influence the public’s interest in the understanding of the scientific outcomes. Our expected outcome is to develop models, that explain and predict the popularity of research across online platforms and documents.
Matthew Mendez
3D Printed Maps for People with Visual Impairments

Author(s): Matthew Mendez, Thomas Pingel
Department: Geography
Faculty Mentor(s): Thomas Pingel
Session Time: Session 4

Although many advances in turn-by-turn, GPS-enabled guidance for people with visual impairments have been made in the last decade, research suggests that map-based learning significantly improves long-term spatial memory and wayfinding performance. As part of the long tradition of touch-based maps, have developed 3D printed maps for people with visual impairments based on laser scans and photogrammetrically reconstructed 3D models of the environment. These methods provide a powerful mechanism to capture local areas at ultra-high resolution, allowing for the construction of highly detailed indoor/outdoor models of the built environment. We expect that such 3D printed maps will provide an improved medium through which people with visual impairments can more efficiently and accurately build cognitive maps of their local environment. This project presents the results of several labeling systems for the 3D maps, so that users can touch and interact with the system to receive audio information about map object via computer rendered speech. We have developed several touch-based systems for audio interaction, including: (a) the PenFriend system, (b) QR codes, (c) laser-pointer, and (d) gesture recognition. We present results evaluating the effectiveness, efficiency, and overall ease-of-use for these methods.

Stephanie Salazar
Immigration Status and Health Professions

Author(s): Stephanie Salazar
Department: History
Faculty Mentor(s): Beatrix Hoffman
Session Time: Session 3

This project examines the accessibility of health care professions for undocumented individuals pursuing higher education in the United States, particularly in California and Illinois. Deferred Action for Childhood Arrivals (DACA) was an executive order created by former President Barack Obama in 2012 that granted undocumented people the ability to remain in the United States, work, and attain a driver’s license. Due to DACA, several of our community members are now able to progress with their career after receiving a bachelor degree from an accredited institution. An organization based in California named Pre-Health Dreamers has immensely contributed to the expansion of support and resources for these individuals as they strive to complete their education. Additionally, the Loyola Stritch School of Medicine based in Chicago, Illinois has created an environment to welcome all applicants with DACA immigration status by creating a unique financial aid package. Based on my research on these establishments, I have created an outline according to Illinois guidelines to determine the relationship between immigration status and licensure exam requirements that will certify a future medical professional.
This student research project is a part of a larger queer youth history project created by Dr. Amanda Littauer. Together, we are asking how same-sex desiring and/or gender non-conforming youth (known today as “queer” lived and survived in the past; we are also exploring how society’s attitudes towards LGBT people have or have not changed over time. Historians often use various written and oral records created from people’s experiences to form an idea of the values and structure of society. The sources we have examined are oral history interviews, letters, and life writings. Our sources focus on individuals in their youth between the years of 1940 and 1985. Our research has examined how these various forms of historical sources have contributed to an initial understanding of queer youth history, about which professional historians have written little about. This work is not just scholarly and archival work; therefore, it also continues the legacy of the LGBT community. The results of our research show that there are common themes shared across written and oral historical sources including how school, family, and the youths’ exposure to LGBT culture affected their coming out process. The relationships that queer youth had with school friends and level of acceptance from family often had an important impact on their development. In our research, we have made sure to prioritize intersectionality to create an understanding about how race, class, gender, and other social and cultural identities have affected how queer youth navigate society.
networks can replicate the main properties of a biological network without the necessary information that differential equations models require.

120 Emily Eckles  
*Der Rosa Winkel: The Colors of Persecution and the Damnation of Homosexual Men in Nazi Germany*

Author(s): Emily Eckles  
Department: History  
Faculty Mentor(s): Amanda Littauer  
Session Time: Session 3

Despite the vast amount of research on the Holocaust, there is little consensus as to why pink triangles had been implemented as designators of gay prisoners in Nazi concentration camps. While there is speculation about the use of the color pink, some believed that it was due to its connection to femininity, which was a key signifier of homosexuality in Germany during this period. However, European countries, including Germany, saw pink as both a masculine and a feminine color, but it varied between populations. Pink was seen as a masculine color when associated with babies and small children, but seen as a feminine color when worn by women. To find the reason behind the use of the color pink, I conducted research on the topic by reading accounts written by gay survivors about their experiences during the war as well as the letters and correspondences between prominent figures in the gay community, examining works of art, and travelling on-site to the Sachsenhausen concentration camp in Oranienburg, Germany. Several conclusions can be made about the use of pink on homosexual prisoners in Nazi concentration camps: 1) pink was considered feminine when used on adults, and it identified that they were same-sex desiring, and 2) Germans believed that homosexuals were child molesters, and that gay men preyed upon children, especially young boys, and 3) Freudian theory suggested that gay men (and lesbians) were psychologically underdeveloped or immature, because they allegedly failed to mature out of adolescent development.

121 Eli Brottman  
*A Computational Approach to Bring Lettuce and Other Essential Commodities to Food-Insecure Communities*

Author(s): Eli Brottman  
Department: Mathematical Sciences  
Faculty Mentor(s): Nathan Krislock  
Session Time: Session 4

Hunger and food insecurity have a significant impact on our nation. To bring more fresh produce to food insecure individuals, we need to figure out how such produce items can be distributed in a cost-effective manner. One such commodity is leafy green vegetables, an essential component of a healthy diet. To work toward better meeting the needs of particularly needy communities, a mathematical model encompassing the national supply of lettuce, along with its demand in the U.S. counties with the highest food insecurity rates, can be implemented. This multi-commodity model, which analyzes the amounts of
different types of lettuce being supplied in each location, can be solved using mathematical optimization software. That software outputs a detailed summary of how much of each type of lettuce should be sent from each supply point to each demand point, such that the total cost to ship it is minimized and the needs of all communities are met. In the output of the solution is other information, such as the marginal, a number which explains the changes in the cost when one of the independent variables is modified. In this research, that data is analyzed, to determine where growth of lettuce should be augmented, such that the cost to ship it is minimized most. These methods can also be applied to analyze the flow of any commodity with clear supply data.

122  Alexandra Hill

*Computing Lattice Points Solutions to Certain Diophantine Equations*

Author(s): Alexandra Hill
Department: Mathematical Sciences
Faculty Mentor(s): Jeffrey Thunder
Session Time: Session 1

This project focuses on studying solutions to certain equations. The solutions sought are whole numbers. The equations considered in the project are certain Diophantine equations. The equations are created with two variables and set equal to a whole number in varying forms. The solutions to these equations are supposed to be positive whole numbers if solutions exist. The moniker “Diophantine Equations” is homage to later Greek mathematician Diophantos who worked on many mathematical concepts in Alexandria around A.D. 250. During the time of Diophantos and ancient Greece, all of the problem solving had to be done by hand. This project, however, will be working with modern computer programs to find solutions.

123  Holly Hansen

*Do Endangered Species Matter?*

Author(s): Holly Hansen
Department: Philosophy
Faculty Mentor(s): Jason Hanna
Session Time: Session 4

This research proposal addresses the question “do endangered species matter?” This question requires us to examine whether endangered species should be saved and why. Many different philosophers have different opinions on the matter. These differences stem from the philosophers’ point of view on the value that these species have. Through analyzing these different values, I will give an example of an endangered species and apply these different views to find the value of this species. Finally, I will give my opinion on the value of species.
124 Mikaela Appleberry  
*X-Ray studies of Cholesterol in Biomimetic Membranes*  

Author(s): Mikaela Appleberry  
Department: Physics  
Faculty Mentor(s): Laurence Lurio  
Session Time: Session 2

I will be creating and studying synthetic phospholipid membranes which are chemically similar to membranes in biological cells. These are known as biomimetic membranes since they mimic the properties of real biological membranes. The biomimetic membranes will contain a mixture of phospholipids and cholesterol in varying ratios. A key question that will be addressed is how the amount of cholesterol effects the structure of the membrane. The structure of the biomimetic membranes will be characterized using a technique called x-ray reflectivity. This technique requires that the membrane sit on top of a flat polished crystal of silicon. The amount of reflection of x-rays from the surface of the silicon crystal can be used to obtain the density of the membrane along the direction perpendicular to the surface. Measurements will be made for different concentrations of cholesterol which should provide information on how the structure depends on cholesterol content. Such information will help explain why different membranes in biological organisms incorporate varying amounts of cholesterol depending on their function in the organism.

125 Paula Moraga  
*Constructing an x-ray waveguide for the study of lipid membranes*  

Author(s): Paula Moraga  
Department: Physics  
Faculty Mentor(s): Laurence Lurio  
Session Time: Session 1

This research project will make an attempt to remove background noise within x-ray reflectometer scans caused by water within a sample cell. An x-ray waveguide will be modeled using Matlab, first setting guiding layer as air, water, and later an artificial membrane. This waveguide will then be constructed using silicon, and tested by scanning an artificial membrane and comparing the results to the theoretical results of the waveguide that was modeled.
126  Amy French  
*Don't steal my food! Food protection in rats with AGm & PPC lesions*

Author(s): Amy French, Philip Blankenship, Douglas Wallace  
Department: Psychology  
Faculty Mentor(s): Douglas Wallace  
Session Time: Session 2

Information processing is critical for survival and organizing behaviors. Neurological disorders such as stroke can disrupt this processing. A common neurological consequence of stroke is hemispatial neglect, characterized by widespread impairments to cognition. Previous work has shown damage to the medial agranular cortex (AGm) or the posterior parietal cortex (PPC) disrupts aspects of spatial processing; however, no work has examined the role of these cortical structures to temporal processing. The food protection task has the capacity to examine both spatial and temporal processes, examining the capacity to protect a food item and organization of food protection behaviors. The current study examined the effects of unilateral AGm or PPC lesions on spatial and temporal processing in a food protection task. Female Long Evans rats (N=14) received a unilateral pial stripping of the left hemisphere AGm (n=6), left hemisphere PPC (n=4), or a sham surgery (n=4). All trials were hand scored for key performance measures including side of robber approach, thefts, distance between noses of dodgers and robbers and the organization of food protection behaviors. Although data analysis is ongoing, the results currently suggest that damage to either of these cortical structures did not disrupt spatial or temporal aspects of food protection behavior. This work provides the foundation for future research investigating this neural network and may lead to treatments that are more effective.

127  Nicholas Casas  
*Identifying Predictors of Congressional Incivility: An individual-level analysis*

Author(s): Nicholas Casas  
Department: Political Science  
Faculty Mentor(s): Scot Schraufnagel  
Session Time: Session 1

This research explores what background characteristics are more closely associated with uncivil acts by members of Congress, while serving in Congress. Put differently, the research seeks to identify biographical attributes that predict uncivil member behavior. The time period of the study is the 45th (1877-78) through the 113th Congress (2013-14). Each implicated member is compared, randomly, with another member from their political party, their chamber, and their Congress, holding constant these factors as possible explanations for uncivil acts. Independent variables tested include: legal education and experience, judicial experience, state legislature experience, ideological alignment, congressional leadership, being the chair of a standing committee, and gender. The analysis suggests both leadership roles, state legislative experience, and gender associate with civility in the hypothesized manner. However, our test of legal background confirms the null hypothesis; there is no difference between those implicated and their matched pair.
BDSM [bondage/discipline, dominance/submission, sadism/masochism] practitioners sometimes distinguish romantic partners from play partners (people with whom they perform BDSM scenes), but no research has examined the differences between romantic relationships and play relationships. To remedy this, 62 BDSM practitioners recruited during the Great Lakes Leather Alliance (GLLA) conference completed a questionnaire regarding their romantic relationships and play relationships. Consistent with predictions, participants were more likely to engage in sexual non-BDSM activities with their romantic partner (92.2%) than with their play partner (45.1%), and participants reported being more physically attracted to their romantic partner (M = 4.96, SD = 1.16) than to their play partner (M = 3.98, SD = 1.41), t(46) = 4.62, p < .001. However, participants who engage in sexual activity with a play partner report physical attraction toward play partners to be more important, (M = 3.69, SD = 1.18) compared to those who do not engage in sexual activity with a play partner (M = 2.41, SD =1.06), t(47) = 3.73, p = .001. Additional results suggest that participants have greater trust in their romantic partner than in their play partner during sexual non-BDSM activities. However, levels of trust did not correlate with relationship length in romantic partners (r =.18, p = .272) or play partners (r = .24, p = .226). This study provides initial insights into the factors that differentiate the types of partners with whom BDSM practitioners share erotic encounters.

Spatial orientation is critical for survival and organizing behavior. Previous research investigating spatial processing has implicated a network of cortical and striatal structures. The current study seeks to examine the contributions of the medial agranular cortex (AGm) and the posterior parietal cortex (PPC) to allocentric spatial processing using the Morris Water Task (MWT). Female Long Evans rats (N=28), either received unilateral pial stripping of the left hemisphere AGm (n =10), left hemisphere PPC (n=8) or a sham surgery (n =10). Two weeks post-surgery, subjects underwent testing in the MWT. The task was comprised of five days of place learning, one probe trial and three days matching to place. Several measures of general performance were analyzed including latency to reach the platform, path circuity, and heading error. While data collection is ongoing, preliminary results have indicated significant improvement in latency across days; however, no group differences have been observed. These results
suggest AGm and PPC damage may not disrupt the use of allocentric processing. Rather, this processing may be mediated by subcortical structures, such as the dorsocentral striatum (DCS) or hippocampus. Further research is necessary to investigate the contributions of these structures to allocentric processing. This study provides the foundation for future translational work examining this processing in humans to further characterize spatial deficits associated with neurodegenerative disease (e.g., stroke or hemispatial neglect).

130 Ashlyn Thurman

The Relationship Between Intolerance of Uncertainty and Distress Reduction Following Neutralization

Author(s): Ashlyn Thurman, Juan Cibrian, Hannah Faleer, Kevin Wu
Department: Psychology
Faculty Mentor(s): Kevin Wu
Session Time: Session 2

Obsessive-compulsive disorder (OCD) involves obsessions that provoke anxiety and compulsions that temporarily reduce anxiety. van den Hout et al. (2001) found that performing two minutes of neutralizing behavior reduced anxiety caused by writing an obsession-like thought. One model of OCD (OCCWG, 1997) suggests symptoms are maintained via dysfunctional beliefs, such as intolerance of uncertainty (IU)—difficulty coping with uncertain situations. The current study aimed to (1) replicate van den Hout et al. by examining the effects of neutralizing behavior following provocation of an obsession-like thought, and (2) extend the literature by examining whether IU may facilitate distress reduction.

Participants (N = 121) were asked to write a sentence designed to evoke an obsession-like thought (I hope [loved one] gets into a car accident today; from Rachman et al., 1996). Participants then were told to do whatever they wished to cancel out the effects of the sentence. Subjective distress was assessed before and after neutralizing; the Intolerance of Uncertainty Scale-Short Form (IUS-12; Carleton et al., 2007) measured trait IU. As hypothesized, distress caused by the sentence task was significantly reduced following neutralizing (p < .001). A regression analysis revealed that IUS-12 scores predicted distress reduction caused by neutralizing, β = .22, t = 2.49, p < .02. That is, as IU levels increased, distress levels following neutralizing decreased, suggesting that trait IU may enhance the effects of neutralizing and contribute to the maintenance of neutralizing (i.e., compulsion-like) behavior. Study limitations and future directions for research will be discussed.
131  Allyson Weick  
*Tugging on Threads: The Effects of Middle Cerebral Artery Occlusion on Rat String-Pulling Behavior, a Test of Bilateral Fine Motor Control*

Author(s): Allyson Weick, Douglas Wallace, Ryan Johnson, Ashley Blackwell, Joe Cheatwood  
Department: Psychology  
Faculty Mentor(s): Douglas Wallace  
Session Time: Session 1

Stroke is a severe cardiovascular trauma that causes disability in many people each year. The most prominent type of stroke, middle cerebral arterial occlusion (MCAO), and the effects that follow as a result, were evaluated in this study. Twelve adult male Long-Evans rats were habituated to the materials used in the study while in a standard housing cage and were later exposed to a series of trainings consisting of five trials per day over the course of four days. After training, the rats were randomly assigned to either the sham or the MCAO group. The MCAO group of rats received an occlusion of the MCA and were allowed a two-day recovery period followed by testing on post-stroke days three, seven, and fourteen. Reach and withdrawal behavior was then captured on video and later tracked and analyzed on a position tracking software to evaluate kinematic and topographic characteristics of fine motor control. Results revealed that MCAO rats exhibited more misses with the left and right hands and fewer contacts with the right hand across testing when compared to sham rats. These results suggest that the functionality of bi-manual, hand-over-hand motor capabilities seen in the string-pulling task were inhibited following MCAO. This work provides the foundation for future transitional work examining stroke-related impairments following MCAO in humans.

132  James Mogan  
*Inhibition’s Role in Mediating Recall of Arguments*

Author(s): James Mogan  
Department: Psychology  
Faculty Mentor(s): Anne Britt  
Session Time: Session 4

Arguments are everywhere but even college students do not always evaluate them accurately. Britt et al. (2008) found college students often inaccurately recalled argument predicates by substituting different terms, including oversimplified replacements called “gist representations” (i.e. “is immoral” becomes “is bad”). Subjects completed three different tasks; an argument recall task in which arguments were judged for agreement and quality and subsequently recalled the argument’s claim (Britt et al., 2008), a go/no-go task to evaluate their ability to adopt new rules while inhibiting previous ones, and a running letter span test as a measure of memory capacity (Salas, 2017). Given the purposeful stimulation of an individual’s personal beliefs during the agreement condition, one’s personal beliefs should be activated and interfere with precise memory for an argument’s claim. The current study assesses whether individuals that are skilled at inhibition are also more skilled at argument evaluation compared to those less skilled at inhibition. Participants judged 44 simple arguments for quality, 22 unwarranted arguments where the reason did not support the claim and 22 warranted arguments where the reason did not support the claim and 22 warranted arguments...
where the provided reason could support the claim, followed by the go/no-go and letter span tests. Participants must inhibit their personal beliefs in their working memory to perform well on argument recall. I hypothesize higher recall in those that perform well on the go/no-go task. This study examines the importance of inhibiting one’s personal beliefs when evaluating and remembering arguments, a quality not only important in academia, but throughout our everyday lives.

133  Candice DuBeau  
*A Formative Examination of the Shyness Mindset Intervention: The First Step Towards Improvement*

Author(s): Candice DuBeau, David Valentiner  
Department: Psychology  
Faculty Mentor(s): David Valentiner  
Session Time: Session 2

Social anxiety is a common and debilitating disorder that often goes untreated (Grant et al., 2005). To improve the interventions already in place it is important to understand the characteristics that can lead to a better outcome for individuals struggling with social anxiety (i.e. shyness mindset). Shyness mindset (Beer, 2002) differentiates individuals who believe shyness is nonmalleable characteristic from those who believe shyness is malleable. This study aims to improve the effectiveness of outcomes of a shyness mindset intervention by using letters from two previous studies to determine whether any characteristics of those letters are associated with better outcomes. We predicted that there is a significant relationship between Linguistic Inquiry Word Count (LIWC) characteristics of those letters and change in shyness mindset as well as the outcome from the previous studies. In this study, 28 participants from two previous studies wrote letters to a fictional student as part of their shyness mindset intervention. Using the LIWC program and a binomial probability distribution approach, two separate indices’ (i.e. Effect on Shyness Mindset and Effect on Criteria) were examined for significant correlations. The results indicated that there were several LIWC characteristics associated with the Effect on Criteria index; Anger and Common Adjectives were significantly associated with better outcomes. These results suggest that shyness mindset interventions could lead to better outcomes by eliciting letters that discuss anger and use more common adjectives.

134  Claire Miller  
*Causes of Congressional Incivility*

Author(s): Claire Miller  
Department: Political Science  
Faculty Mentor(s): Scot Schraufnagel  
Session Time: Session 1

Our research reveals characteristics and background information about congressmen that directly and indirectly relate to implications of incivility. We seek to uncover the similarities between some of our country’s most notoriously uncivil legislatures in order to reveal patterns in the variables that may lead to these occurrences. In other words, our research attempts to explain exactly what makes certain
people uncivil, and, opposingly, what makes others more agreeable. Our recorded data applies to those from the 45th (1877-78) Congress through the 113th (2013-14). Each congressional member implicated for incivility within this time range was randomly matched with an unimplicated member from their same Congress, their same chamber, and their same political party. By controlling these variables, we were able to discount them as possible causes of incivility. Our independent variables then became the fuel of our research; we measured all matched pairs for the following characteristics: legal education, legal practice, ivy league education, judicial experience, military experience, congressional leadership, military leadership, ideological affiliation, being a chair of a standing congressional committee, gender, and having an interrupted term, among others. We hypothesized that leadership roles and state legislature experience would decrease the likelihood of being implicated for incivility. Our results, however, expelled varied patterns, meaning that some variables displayed positive, negative, or neutral relationships with incivility depending on the year of the data, the congressional party division during that year, and other factors.

135 Joey Petersen

*Stringing together species: Comparing kinematic and topographic characteristics of bimanual string-pulling behavior in humans (Homo sapiens) and rats (Rattus norvegicus)*

Author(s): Joey Petersen
Department: Psychology
Faculty Mentor(s): Doug Wallace
Session Time: Session 4

Manipulatory scale space constrains many aspects of fine motor movement and has likely influenced the evolution of neural structures that mediate this behavior. Recent work has demonstrated that spontaneous string-pulling behavior in rodents is a highly organized sequence of movements. The current study used motion capture software to characterize movement organization during string-pulling behaviors in humans (Homo sapiens) and rodents (Rattus norvegicus). The first experiment examined topographic and kinematic aspects of movement when both species spontaneously engaged in string-pulling behavior. Both species were observed to organize their movements into a sequence of reach and withdraw phases that alternated between hands. The second experiment examined the effects of increasing string weight on the organization of string-pulling behavior. Both species exhibited systematic changes in manipulatory scale movement associated with increasing weight in the string-pulling task. This comparative work establishes that humans and rats, with limited training, exhibit similar spontaneous and dynamic range of string-pulling behavior. These characteristics make string-pulling an ideal fine motor task to investigate rodent models of neuropathology and may provide a useful assessment of the efficacy of novel therapeutic interventions.
Latece Phillips
The Relationship Between Adolescents' Perceptions of Parental Warmth and Levels of Aggression and Prosocial Behavior

Author(s): Latece Phillips, Natalie Low, Nina Mounts
Department: Psychology
Faculty Mentor(s): Nina Mounts
Session Time: Session 2

Past research has highlighted the importance of parental warmth on adolescents’ social development. To provide a holistic account on adolescents’ social development, we examined the relationship between adolescents’ perception of parental warmth and areas of relational aggression (RA), physical aggression (PA), and prosocial behavior (PSB). We hypothesized that higher levels of parental warmth perceived will be associated with lower levels of RA and PA and higher levels of PSB. The sample consisted of 70 adolescents (Mage = 12.39 years; Male n= 34, Female: n= 36). Adolescents completed a battery of questionnaires. Perceptions of parental warmth (α=.94) was assessed using Children’s Report of Parent Behavior Inventory. RA (α=.74), PA (α=.81) and PSB (α=.77) were evaluated using the Children’s Social Behavior Scale Self Report. Independent samples t-test were first conducted to examine any gender differences within adolescents’ perception of parental warmth, RA, PA, and PSB. Significant gender differences were observed only for PSB, t (67) = 2.995, p = .004, indicating that girls (M = 4.264) exhibited higher levels of PSB compared to boys (M = 3.712). Hierarchical regression analysis was then conducted to examine the relationship between adolescents’ perception of parental warmth and social development. Higher levels of parental warmth perceived were significantly related to lower levels of RA (Beta = -.276, p = 0.19), lower levels of PA (Beta = -.327, p = .002), and higher levels of PSB (Beta = .238, p = 0.41).

Marco Kopecky
Lost in the Dark: Using the sequential analysis of exploratory behavior to examine the contributions of the AGm and PPC in spatial orientation

Author(s): Marco Kopecky, Philip Blankenship, Douglas Wallace
Department: Psychology
Faculty Mentor(s): Douglas Wallace
Session Time: Session 3

Spatial orientation depends on processing multiple sources of information and is essential in everyday life. Neurological disorders like stroke often result in hemispatial neglect that can disrupt processing stimuli relative to the body’s egocentric reference frame. Deficits in egocentric processing may impair self-movement cue processing; however, little work has examined the contributions of cortical structures to this type of spatial processing. For this study, female Long Evans rats (N=27) either received unilateral pial stripping of the left hemisphere AGm (n=10), left hemisphere PPC (n=8), or received a sham surgery (n=9). After two weeks of recovery, all rats underwent two days of exploration under dark conditions. Each trial lasted for forty minutes. Sequential analysis of exploratory behavior, conducted from a 20-minute subset of a trial, involved segmenting movements into stops and
progressions. The results suggest that AGm and PPC lesions minimally influenced the organization of exploratory behavior. Specifically, AGm and PPC rats were shown to travel longer distances across the first two samples of exploration when compared to Sham rats. Further, AGm rats were shown to exhibit larger changes in heading when compared to PPC and Sham rats. This suggests that AGm and PPC lesions spared motor coordination; whereas, the AGm may have an indirect role in self-movement cue processing. This work establishes a foundation for future studies examining therapeutic interventions targeting these cortical areas.

Maya Mosley

The Effects of Mentorship on Work-Life Balance

Author(s): Maya Mosley, Courtney Thomas, Lisa Finkelstein
Department: Psychology
Faculty Mentor(s): Lisa Finkelstein
Session Time: Session 1

Mentorship is a rapidly expanding area of psychological study. In the existing research, mentor relationships have been shown to lead to beneficial outcomes such as job satisfaction and retention (e.g., Ensher & Murphy, 1997; Mitchell, Eby, & Ragins, 2015). However, very limited research has explored the impact of mentors on mentees' work-life balance. Greenhouse and Singh (2007), noting the dearth of information about whether mentors would be able to provide mentees with the ability to achieve a healthy work-life balance, proposed a model by which mentors could impart a work-family lens. In the time since the model was proposed, there has been little to no experimental examination of the relationship between mentors' role modeling of behaviors and mentee outcomes. The current research will cross mentor behavior and encouragement and examine their impact on mentees. Participants, recruited from undergraduate psychology courses, will be presented with a scenario attached to one of four randomly assigned conditions: a mentor will display balanced or unbalanced work-life behavior; and the mentor will also provide encouragement or discouragement of balanced work-life behavior. Subsequently, participants will be presented with a questionnaire composed of items adapted from measures on work-life balance (Valcore, 2007), perceived similarity (Matarazzo, 2011), anticipated job satisfaction (Hanna, Kee, & Robertson, 2017), anticipated organizational identification (Mael & Ashforth, 1992), anticipated CWBs (Williams & Anderson, 1991; as used in Masterson, Lewis, Goldman, & Taylor, 2000; as used in Mitchell & Ambrose, 2007), anticipated OCBs (Swaminathan & Jawahar, 2013), and turnover intentions.
Watch your step! Evaluating the effects of delayed immunotherapy administration following a unilateral MCAo

Author(s): Megan Lipton, Ashley Blackwell, Philip Blankenship, Shih Yen Tsai, Gwendolyn Kartje, Douglas Wallace
Department: Psychology
Faculty Mentor(s): Douglas Wallace
Session Time: Session 2

Stroke is one of the most prevalent causes of death in the world today; however, it remains a leading cause of long-term impairment. Stroke can lead to a loss of neuronal functioning in adults, which can impair cognitive and motor function. Current therapeutic strategies are often unsuccessful resulting in compensation rather than recovery. Recently, focus has shifted toward immunotherapy and the use of anti-NOGO-A (11C7), which has shown promise in promoting neuroplasticity of locomotor coordination after a nine-week delay period. The present study examined the effect of 11C7 treatment following a middle cerebral artery occlusion (MCAo) in rats on a rung-walking ladder task. Performance was assessed by recording latency to cross the rungs and counting the number of deep slips, shallow slips, and misplacements on each limb. While data analysis is ongoing, the results of this study will provide evidence of the efficacy of immunotherapy 11C7 to promote neuroplasticity after a significant delay period following MCAo in a rodent model of stroke. This study may provide a framework for future research implementing immunotherapy as a means of promoting recovery in human stroke patients.

Safe Words

Safe words can be defined as pre-negotiated words or actions that partners can use when a sensation or activity is deemed undesirable. Individuals use safe words in sexual situations to let their partner know that they are at or near their limit. Safe words are used most often with BDSM (bondage/discipline, dominance/submission, sadism/masochism) activities; without them, individuals could cause accidental physical and mental discomfort and harm to their partner(s). For the study, 153 participants were recruited from BDSM community conferences. 26.8% of participants identified as a top (the person providing orders or administering sensation during BDSM scenes), 39.0% of participants identified as a bottom (the person receiving orders or sensation), and 32.9% of participants identified as a switch (a person who sometimes acts as a top and sometimes acts as a bottom). The purpose of this study was to identify factors that encourage or discourage people from using safe words in various types of scenes. Of the participants surveyed, 86.3% identified as having a safe word and 93.5% are allowed to use a safe word during a scene. Substantially more bottoms than tops have used safe words (bottoms: 52.3% during public scenes, 58.8% during private scenes; tops: 25.5% during public scenes, 28.1% during
private scenes), although fewer bottoms and tops have used safe words during public scenes than
during private scenes. Additional factors that encourage or discourage safe word use were identified
through open-ended responses.

Word Count: 235

141 Nicholas Zanayed
Justifications for Argument Evaluation

Author(s): Nicholas Zanayed
Department: Psychology
Faculty Mentor(s): Anne Britt
Session Time: Session 1

Many times, when reading arguments, people are unable to remember important features of what they
have just read (Britt et al., 2007). This, in turn, can lead to an improper evaluation of the argument. The
purpose of this study is to identify some features associated with proper and adequate argument
evaluation as well as to identify when and why argument features are lost during processing. This study
is a two by two design. There will be 32 arguments and the participants will be prompted to either
correctly identify the theme or predicate of an argument after the claim or reason of the argument is
shown, along with 32 fillers items. The participants will also take a sample LSAT to test their verbal
reasoning skills, along with an RSPAN task at the end, to assess their working memory capacity. The goal
of the study is to determine how these factors impact timing and accuracy of argument features.

142 Jocelyn Zambrano
The Differences in Parent Involvement Across Caregivers

Author(s): Jocelyn Zambrano
Department: Psychology
Faculty Mentor(s): Julia Ogg
Session Time: Session 2

The purpose of this study is to investigate the differences in involvement in education by mothers versus
fathers, or any dyad of primary caregivers, and how these differences may influence child outcomes.
Hoover-Dempsey and Sandler (2005) suggest that personal motivators are the basis for parent’s
decisions to become involved. In their model describing parent involvement, they describe personal
motivators as the responsibility a parent feels to become involved, whether they believe their
involvement will help, whether they feel like their involvement is expected or needed, and whether they
have the personal and societal resources to respond to their child’s educational needs. Hoover-Dempsey
and Sandler (2005) also describe the many forms parent involvement can occur. A parent is said to be
involved when they portray to their child that learning is valuable, when they help with homework,
when they attend school events, and when they contact their child’s school. This project will look at the
most influential motivators for involvement, the patterns of involvement, and how these patterns of
involvement by multiple caregivers affect child outcomes. Fathers and other caregivers (e.g. step-
parents, grandparents, adoptive parents, extended family, etc.) have often not been included in empirical research, so it is important to learn more about the motivators and outcomes of multiple parental figure’s involvement. Understanding the relationship between motivations and the decision to get involved by both caregivers can help find ways to promote the best outcomes for children.

143  Wendy Goes

*Invisible Disability in the Workplace: Navigating the Disclosure Decision*

Author(s): Wendy Goes, Alecia Santuzzi
Department: Psychology
Faculty Mentor(s): Alecia Santuzzi
Session Time: Session 4

This research project is focused on understanding the factors associated with individuals’ decisions to disclose invisible disabilities in the workplace and other social situations. Often times those who have invisible disabilities face the risk of social stigma with disclosure. This could make going to work more stressful than it would have been for them if they only had to worry about their work tasks and features of their disability. Instead, these workers may experience the additional burden of managing whether or not they disclose the disability at work.

The positive side of disclosing their disability could result in them receiving accommodations that could help lower the amount of challenge they experience during work tasks. Disclosure also reduces the burden of decision-making about disclosure (as a decision has already been made). It is expected that the benefits of disclosing the invisible disability will generally outweigh the negative consequences, but only after controlling for social stigma. I analyzed qualitative data from semi-structured interviews to address the key research questions.

144  Chelsea Musson

*Blast from the Past: How valence and achievement context of memories relates to recalled experiences*

Author(s): Chelsea Musson, Katelyn O’Connell, Juan Cibrian, Nia Harris, Audra Jensen, Sarah Coley, Amanda Durik,
Department: Psychology
Faculty Mentor(s): Amanda Durik
Session Time: Session 3

This project explores how people remember memories from their past. One way in which memories differ is that they may be positive or negative. Prior research shows that negative emotion from negative memories fades faster than positive emotion from positive memories. This is referred to as the Fading Affect Bias (FAB). The FAB has not been tested specifically with regard to achievement memories (i.e., when people care about doing well). Achievement memories might be associated with less fade because people are personally invested in experiences in which they care about doing well. On the other hand, the negative emotion associated with an achievement memory may fade faster if people feel like they learned from the experience, especially if the experience is still “open” (i.e., still have a
chance to improve). Participants (N = 168) from a mid-sized Midwestern university were asked to recall a general positive and negative memory, as well as an achievement based positive and negative memory using an online survey. We expect that FAB will be more pronounced in general memories than in achievement-based memories because of the personal involvement in achievement situations (i.e., personally caring about doing well). However, the amount of fade of negative achievement memories will be positively correlated with feelings of having learned from the experience compared to other memory types.

145 Alexia Kingzette

Reassurance Seeking and Spoiled Answers on Academic Tests

Author(s): Alexia Kingzette, Anna Snyder, Jessica Winder, Anne Britt, David Valentiner
Department: Psychology
Faculty Mentor(s): David Valentiner
Session Time: Session 2

The current study examines the relationship between test-related reassurance seeking and spoiled answers on academic exams. Previous research has found that reassurance seeking is associated with underperformance on the ACT (Knoll, Valentiner, & Holzman, 2016). These researchers theorized that the relationship between reassurance seeking and performance on standardized exams is mediated through the number of answers changed from correct to incorrect (i.e., spoiled). The current study used the Safety Behaviors in Test Anxiety Questionnaire (SBTAQ) in the context of predicting exam performance in an academic course. Participants were students (N = 556) in an introductory psychology course. These students received a packet that instructed them to complete a variety of course assignments and activities focused on enhancing motivation, including the 10-item Reassurance Seeking Scale (RSS). After students were provided with feedback about their performance on the first exam in the course, they were directed to complete the assignment packet during a regular class session. Of interest was the ability of this scale to predict performance on the second course exam. The RSS showed significant correlations with spoiled answers, which supports the hypothesis that test-related reassurance seeking significantly predicts spoiled answers on a subsequent exam. Additional analyses are still being conducted to examine the association of RSS with spoiled answers as a function of item characteristics (i.e., item difficulty and discriminability). Thus far the results provide support that test-taking reassurance seeking is associated with performance on academic tests and provides new evidence about the underlying process involved with spoiling answers.
Past research has examined altered states of consciousness and feelings of closeness experienced by BDSM practitioners during and after BDSM scenes (Ambler et al., 2017; Sagarin, Cutler, Cutler, Lawler-Sagarin, & Matuszewich, 2009). The present study was designed to replicate and extend this research by examining which effects occurred during the scene and which effects occurred during aftercare, the period of time after main scene activities in which the participants sit together, cuddle, and/or talk quietly while reentering a regular psychological state. At “Beat My Valentine,” a BDSM event in Indianapolis, 26 participants volunteered to complete surveys and cognitive tests at baseline, immediately preceding and proceeding scene activities, and proceeding aftercare. Surveys measured levels of negative and positive emotions, altruism, and feelings of closeness. The final survey also solicited more open-ended responses concerning closeness and scene success. Positive affect decreased slightly during the scene and significantly during aftercare. Negative decreased significantly from before the scene to after aftercare. Self-other overlap, which measured closeness, increased significantly during the scene and then decreased slightly during aftercare. Sexual arousal and stress did not change significantly. Both tops and bottoms showed high levels of flow, with tops showing particularly high levels of optimal performance both before and after their scenes, and bottoms showing significant increases in autotelic absorption from before to after their scenes.

147  Eder Villagomez

*Does Trust of Parent–Teacher Relationships Predict Levels of involvement?*

Author(s): Eder Villagomez, Sergio Espana, Karina Alcantara
Department: Psychology
Faculty Mentor(s): Julia Ogg
Session Time: Session 3

Existing research has shown that parental involvement is associated with students’ academic achievement (Fan & Chen, 1999; Fehrmann, Keith, & Reimers, 1987; Stevenson & Baker, 1987). Data has shown that there is a positive correlation between involvement in schools and trust levels (Adams & Chrisenson, 1998; Pena 2000). Higher socioeconomic status (SES) has also been shown to correlate with higher levels of parental involvement. (Grolnick, Benjet, Kurowski, & Apolsoleris, 1997). Studies have also reported that SES might have an effect on the parents’ perceived cooperation of the school, which in turn influence how much the parents trust in the school system (Davis-Kean & Eccles, 2005; Hoover et. al, 2005). However very little work has shown how SES and trust might work together to influence parental involvement at home and school. SES may be a moderator between the relationship of parental
trust and parental involvement since it has been known to influence some of the key motivators behind parental involvement (Hoover et. al, 2005). The current study seeks to examine how parental involvement at home and at school setting may be influenced by the level of trust the parent perceives towards the school. Additionally, this study seeks to understand if SES moderates the relationship between parental trust and parental involvement.

148  **Juan Cibrian**  
*Frogs Have Super Powers: Testing Whether Surprising Information Increases Interest in Scientific Passages*

Author(s): Juan Cibrian, Audra Jensen, Sarah Coley, Amanda Durik  
Department: Psychology  
Faculty Mentor(s): Amanda Durik  
Session Time: Session 4

This study investigated how scientific materials could be presented to elicit interest in readers. We tested whether high levels of surprise, in comparison to low surprise, would prompt readers to continue reading a scientific passage when given the option to stop. The passage conveyed information about frogs in the Caribbean during and following hurricanes. This passage was presented in sections. Participants were randomly assigned to different versions of the introduction that intended to make the main point of the passage more or less surprising. The second section stated the main point of the passage. Afterward, participants chose to continue or discontinue reading the passage, which explained the main point of the passage. We hypothesized that participants in the high-surprise condition would continue reading more often than participants in the low-surprise condition. Participants sourced from Amazon’s Mechanical Turk were randomly assigned to one of the two conditions. Whether or not participants continued reading, interest, valence, surprise, resolution, and passage comprehension were assessed. We calculated the percentage of participants who chose to continue reading the passage for each condition and used a Chi-square test to determine if conditions were significantly different. In addition, we tested whether those who decided to continue reading reported greater interest, surprise, and perceived resolution. Analyses and interpretation of the results is underway.

149  **Kelly Harrington**  
*Effect of Beliefs on Argument Evaluation*

Author(s): Kelly Harrington  
Department: Psychology  
Faculty Mentor(s): Anne Britt  
Session Time: Session 1

Students are bombarded with arguments every day that relate to their personal beliefs. The arguments can support their beliefs or try to oppose against them. When someone encounters an argument they have to evaluate it whether or not it agrees with their beliefs. Other studies have shown that individual differences can impact someone’s ability to evaluate arguments (Britt et al. 2016). The purpose of this study is to determine if a person’s beliefs alter the speed and accuracy in which a person judges an
argument for quality. It is expected that if a person agrees with a claim, then they are more likely to judge an argument inaccurately with a short response time compared to those who disagree (Edwards & Smith 1996). Those who disagree with a claim will be more inclined to slow their thought process and respond more accurately on the actual strength of the argument.

150  Kortney Maedge

*Food Protection Behaviors in Rats with Chronic Juvenile Methylphenidate Treatment*

Author(s): Kortney Maedge, Lauren Nape  
Department: Psychology  
Faculty Mentor(s): Leslie Matuszewich  
Session Time: Session 3

To avoid theft, rats display food protection behaviors towards an approaching rat. They exhibit either dodging (moving body away) or bracing (pivoting torso away) behaviors depending upon the amount of time they estimate they need to eat the remaining food. To estimate the amount of time needed to consume the food, rats use neural timing mechanisms, which can be altered by drugs that act on the dopamine neurotransmitter system. The stimulant methylphenidate or “Ritalin” is widely used to treat attention-deficit/hyperactivity disorder and works by increasing dopamine in the brain. Given the use of methylphenidate on children, the current study investigated the long-term effects on food protection behaviors, which are indicative of timing mechanisms. Sixteen male and female Sprague Dawley rats were orally administered 2 mg/kg of methylphenidate on vanilla wafer cookies from day 21 to 35 of peri-adolescence. In adulthood, treated rats were tested for five days with another rat who attempted to steal a food item. Food protection behaviors were recorded, which included dodging and bracing behaviors. To further understand whether dopamine systems in the brain were altered by early methylphenidate exposure, rats were injected with the stimulant D-amphetamine (0.25 mg/kg i.p.) prior to food protection testing. It’s hypothesized that early treatment with chronic methylphenidate would enhance dodging behaviors following an acute injection of D-amphetamine, suggesting that chronic exposure to methylphenidate in peri-adolescence would increase sensitivity to D-amphetamine in adulthood. This study has implications in understanding the long-term effects of prescribed psychostimulants on naturally occurring timing behaviors.

151  Krista Havens

*Exploring Why Titles Matter in Artworks*

Author(s): Krista Havens, Samara Wyatt, Vanessa Poppe, Megan Lundgren  
Department: Psychology  
Faculty Mentor(s): Keith Millis  
Session Time: Session 2

Prior research has shown that titles to paintings affect viewer responses, such as liking, interest, and understanding. For example, research has shown that titles which pose an elaborative or metaphorical title result in greater liking than titles that describe the depicted scene. This has been termed the elaboration effect. The elaboration effect is rather robust in that both novices and expert viewers
show the effect, and the effect persists even when participants know the titles are false. However, the effect does not occur under quick viewing time (e.g., 1 versus 10 seconds). One interpretation of the elaboration effect is that it arises when viewers can achieve an elaborated but coherent representation that combines information from both the title and the painting. However, to date, there has been no test whether elaborations (activated ideas other than the explicit content) are responsible for the effect. The current experiment tested this directly. Participants ‘thought aloud’ to viewing simple paintings which were accompanied by either a descriptive or an elaborative title. Based on recent unpublished data, one half of the paintings had shown a strong elaboration effect whereas one half did not. Data analyses are being conducted that test whether more elaborations occur for paintings that have shown the elaboration effect than for those which have not.

152 Matthew Atterberg

*Emotion Regulation and Distress Tolerance as Potential Predictors of Symptoms of Anxiety*

Author(s): Matthew Atterberg, Matthias Miller, David Bridgett
Department: Psychology
Faculty Mentor(s): David Bridgett
Session Time: Session 4

The purpose of the current study was to investigate the contribution of emotion regulation difficulties and distress tolerance to anxiety symptoms in a sample of emerging adults. Furthermore, the possibility of an interaction between emotion regulation and distress tolerance in relation to anxiety symptoms was considered. Few studies have jointly considered emotion regulation difficulties and distress tolerance in relation to anxiety symptoms. However, some studies have found evidence that there is an association between difficulties in regulating emotion and symptoms of anxiety. For example, deficits in emotion regulation tend to be present in individuals who have generalized anxiety disorder (Salters-Pedneault, Roemer, Tull, Rucker, & Mennin, 2006). Also, there is evidence to suggest that difficulty in emotion regulation may contribute to social anxiety, and one’s withdrawal from stressful social situations (Helbig-Lang, Rusch, & Lincoln, 2015). Separately, distress tolerance has also been shown to have a negative association with anxiety (Keough, Riccardi, Timpano, Mitchell, & Schmidt, 2010). On the basis of existing evidence, two hypotheses were formed for this study. 1. Emotion regulation difficulties will have a positive association with symptoms of anxiety. 2. Distress tolerance will have a negative association with anxiety symptoms. Finally, no studies have considered the possibility of emotion regulation difficulties and distress tolerance interacting in relation to anxiety symptoms such that, distress tolerance acts as a moderator of the association between difficulties in regulating emotion and anxiety. Specifically, the relationship between emotion regulation difficulties and anxiety symptoms may be attenuated when individuals have high distress tolerance.

153 Mandy Miller

*OTOLITH DYSFUNCTION DISRUPTS EXPLORATORY MOVEMENT ORGANIZATION ACROSS TWO DEVELOPMENTAL TIME POINTS*

Author(s): Mandy Miller, Tia Donaldson
Department: Psychology
Animals use multiple sources of information to maintain spatial orientation. Previous work has shown that mouse exploratory behavior organization depends on self-movement cues derived from the vestibular system. The current study examines developmental changes in the role of the otolith organs in an otoconia deficient mouse model (tilted mice) for organizing exploration at postnatal days 35 and 84. Under dark conditions, control (n=12) and tilted (n=9) mice explored a borderless circular tabletop. A novel sequential analysis was used to segment exploratory movements into progressions and stops. Although behavior was similar both developmental time points, tilted mice traveled significantly shorter distances, spent more time stopped, and had larger changes in heading between progressions relative to control mice. These observations suggest that otolith signals influence movement organization early in life, and thus have important implications for development in altered gravitational fields. Further analysis is underway to characterize stop clustering behavior as a measure of home base establishment. This study provides further evidence for the role of the vestibular system in maintaining spatial orientation.

154  Megan Milner

Is Viewing a Painting Really Like Reading?

Author(s): Megan Milner, Megan Lundgren, Christian Steciuch, Keith Millis
Department: Psychology
Faculty Mentor(s): Keith Millis
Session Time: Session 3

Humans are frequently thinking, making connections, and evaluating situations in everyday life, which creates an internal dialogue in our minds. Whether or not the connections and thoughts we have across different modalities has implications for our understanding of the mind (Loughlin et al., 2015). These thoughts, or trans-symbolic comprehension processes, include identifying explicit ideas, making connections among explicit ideas, elaborating the explicit ideas with prior knowledge, and monitoring one’s understanding. The current study sought to explore this notion in two ways. The first hypothesis tested whether or not these comprehension processes occur to similar extents across two media (paintings and texts). If these processes truly are trans-symbolic, we would expect them to occur not only for both media but in similar amounts. The second hypothesis investigated the relationship between the coherence-building trans-symbolic processes (paraphrasing, bridging, and elaborating) with aesthetic responses like enjoyment and interest. This is based on the idea that we like what we understand. Participants’ comprehension processes were revealed by having them think-aloud while they viewed paintings and read short narratives. Each of the participants responses were broken up into independent clauses and were then coded separately by two rates to ensure inter-rater reliability. Interrater reliability was achieved with an acceptable level of Cohen’s Kappa of .80. The data are currently being analyzed but will be finalized by the time of the conference.
155  Miranda Cox  
*Protecting Against Social Isolation Stress in Young and Old Populations with Environmental Enrichment in an Animal Model*

Author(s): Miranda Cox, Samantha Sujet, Cassidy Padal, Nicole Holzapfel, Sarah Ciosek, Blessy Johnson, Neal McNeal, Angela Grippo  
Department: Psychology  
Faculty Mentor(s): Angela Grippo  
Session Time: Session 4

Social stress, such as isolation, hinders the body's regulation of behavior and certain organs, potentially leading to depression or anxiety. Elderly populations may be especially vulnerable to social stress due to partner loss, decreased mobility, or differential responses in brain regions associated with stress and emotion. Fortunately, environmental enrichment (EE) may protect against the negative effects of social stress regardless of age. EE involves physical and cognitive tasks that stimulate the brain in a positive way, promoting neuron growth. The present study utilized the prairie vole rodent model to determine whether EE can protect against the consequences of social stress in both young and old populations. Prairie voles have a similar social structure to humans and react negatively to social stress. Young and old prairie voles were assigned to independent groups of pairing with a sibling (control), isolation in a standard cage, or isolation in a cage with EE for 4 weeks. Following this period, all animals were assessed for anxiety and depressive behaviors using behavioral tasks. Prairie voles in both age groups that were paired or isolated with EE displayed lower levels of anxiety and depressive behavior compared to isolation in a standard cage. The brains of old prairie voles may show changes in neuron function and structure in the hypothalamus, hippocampus, or amygdala, which are important regions that regulate stress reactivity. EE might protect against some of these changes. The data have important implications for understanding and treating social stress across age groups.

156  Mark Oliveras  
*The Relation Between the Use of Emotion in Adolescent Language and Anxiety*

Author(s): Mark Oliveras, Natalie Low, Nina Mounts  
Department: Psychology  
Faculty Mentor(s): Nina Mounts  
Session Time: Session 2

Previous research has examined how emotions used in language are related to anxiety levels. In this study, we were interested in examining the relationship between adolescents’ positive emotions (PE) and negative emotions (NE) in language use and levels of anxiety. We hypothesized that the greater use of PE and NE in language would be associated with lower and higher levels of anxiety, respectively. The sample was comprised of 70 adolescents (Mage = 12.39 years; male: n=34, female: n=36). Mother-adolescent dyads completed questionnaires. They also participated in video recorded discussion tasks in which they converses about hypothetical situations involving typical peer-related issues. Conversations were first transcribed verbatim and, subsequently, analyzed using the Linguistic Inquiry and Word Count 2015 software for affective processes ($\bar{z}=0.57$), more specifically, PE ($\bar{z}=0.64$) and NE ($\bar{z}=0.55$). Total
anxiety (α=.93), social phobia (SP) (α=.65) and generalized anxiety (GA) (α=.78) were evaluated using the Spence Children’s Anxiety Scale. Independent samples t-tests suggested significant gender differences in total anxiety, t (67) = 2.928, p=.005 and GA, t (67) = 2.38, p=.020, indicating that girls experienced higher levels of anxiety (Mtotal=36.22, MGA=7.6) compared to boys (Mtotal=24.91, MGA=5.62). However, no differences were found for PE, t (67) = .219, p=.83, and NE, t (67) = .83, p=.411. Hierarchical regression analyses were conducted to examine the relationship between emotional language use and anxiety levels. Higher levels of PE use were associated lower levels of SP (Beta=-.23, p=.049) and GA (Beta=-.23, p=.050). There was a significant gender by NE interaction in SP (b=1.94, p=.0304).
Many people cannot accurately comprehend and evaluate arguments even though this skill is essential for daily life. Larson et al. (2009) found that most high school and college students could not recognize flawed arguments that were unwarranted or unsupported. The ability to evaluate arguments was improved with the use of a tutor but many students believed they were competent in this skill before they were shown otherwise (Larson et al., 2009). The motivation aspect of the tutor might be a large factor in improving students’ argumentation skills. Gaspard et al. (2015) found that motivation by reading relevance quotes from peers is effective in improving math skills in students. The current study shows all participants their gap in knowledge on argumentation and employs a tutor to help teach participants the skill. The goal of this study is to assess if utility motivation greatly impacts attainment of argument skills from the tutor. Participants in the experimental group read quotes from peers on the usefulness of the tutor and were asked to rate the relevance of these quotes to their own lives. The control group did not receive the motivation condition. A pretest and posttest was used to measure growth. They consisted of 38 arguments that participants had to assign as flawed or minimally acceptable based on structure. We hypothesize that participants who receive utility motivation will present more argumentation skills than those that did not receive motivation.

Adolescents with stronger ethnic identities (EI) perceive themselves as having greater acceptance from peers. To further explore how EI influences the establishment of social relationships, the current study examines the influence of adolescents’ individual EI on friendship quality (FQ) and levels of social skills (SS). We hypothesized that EI would be positively correlated with SS and positive FQ and negatively correlated with negative FQ. A sample of healthy adolescents (males: n=37; females: n=49) completed a battery of questionnaires. EI (i.e. affirmation/belonging, $\rho=0.85$; and exploration, $\rho=0.76$) was assessed using the Ethnic Identity Scale, FQ (i.e. positive, $\rho=0.93$ and negative, $\rho=0.82$) was evaluated using the Friendship Quality Questionnaire and SS (i.e. cooperation, $\rho=0.75$; assertion, $\rho=0.71$; self-control, $\rho=0.76$; empathy, $\rho=0.80$) were measured using the Social Skills Rating System. Independent samples t-tests were conducted to examine gender differences in areas of SS and EI. Significant gender differences were observed for levels of empathy, $t(85) = -3.48$, $p=.001$ and positive FQ, $t(84) = -5.20$, $p<.001$, indicating that girls experienced higher levels of empathy (M=15.72) and positive FQ (M=3.00) compared
to boys (Mempathy= 13.35; Mpositivef= 2.36). Hierarchical regression analyses were conducted to examine the relationship between EI, FQ and SS. Higher levels of ethnic affirmation/belonging were associated with higher levels of cooperation (Beta=.32, p=.003) and empathy (Beta=.24, p=.017). Higher levels of ethnic exploration were associated with higher levels of cooperation (Beta=.26, p=.014). Significant gender differences were observed in ethnic exploration in relation to levels of empathy (p=.028).

159 Zoe Bond

*Effects of Corticosterone in Drinking Water on Motivation to Self-Administer Sucrose*

Author(s): Zoe Bond, Marilyn Chakkalamuri, Mercedes McWaters, Eden Anderson, Emily Errante
Department: Psychology
Faculty Mentor(s): Leslie Matuszewich
Session Time: Session 1

Everyday stressful experiences may affect our motivation to engage in pleasurable activities, such as eating palatable food. Our lab has previously found that exposure to 10 days of unpredictable stress reduced motivation for a sucrose reward. Exposure to stress alters physiological processes within the body with one of the more critical changes being the release of the stress hormone, cortisol/corticosterone. The present study was designed to explore how corticosterone, a stress hormone in rodents, influences the motivation of rats to lever press for a sucrose reward. We hypothesize that administration of corticosterone would reduce the motivation for a sucrose reward as indicated by fewer bar presses, similar to exposure to chronic stress. Adult male and female rats were given corticosterone or a vehicle through their drinking water for 10 days to mimic the increase in stress hormones caused by repeated stress. One week after corticosterone administration ended, rats were trained to lever press for a reward on a fixed ratio schedule of reinforcement for 5 days and then tested on a progressive ratio schedule to assess motivation. The progressive ratio test requires rats to work increasingly harder to earn a sucrose reward which is indicative of motivation. After testing, the data was analyzed to determine the effect of corticosterone on motivation. While no effects of corticosterone were found, females earned more rewards than males. This sex difference suggests that there is an inherent difference between males and females in motivation, albeit not influenced by corticosterone exposure.

160 Sarah Ciosek

*The Study of Behavior in an Animal Model of Stress*

Author(s): Sarah Ciosek, Miranda Cox, Nicole Holzapfel, Cassidy Padal, Samantha Sujet, Angela J. Grippo
Department: Psychology
Faculty Mentor(s): Angela Grippo
Session Time: Session 4

Social stress can lead to anxiety and depression in humans. Prairie voles are valuable rodent models of social stress because they display similar social behaviors to humans. Stressful conditions can invoke
anxiety- and depression-relevant behaviors in prairie voles, as evidenced by behavioral tests. The Open Field Test investigates anxiety. Once the animal is placed in the center of the box, its behaviors (rearing and grooming) and location (perimeter and center) are scored. A prairie vole’s location in the center suggests less anxiety than the perimeter, and grooming suggests less anxiety than rearing. The Elevated Plus Maze also measures anxiety by observing the animal’s exploration of a plus maze’s center, closed (protected) arms and open (unprotected) arms. Exploration of the open arms suggests less anxiety than the closed arms. Passage through the center measures activity level. The Forced Swim Test measures depression. The prairie vole is placed in a water bath, and its behaviors are scored as swimming, climbing, struggling, and floating. Swimming, climbing, and struggling are considered active coping behaviors, and floating is considered failing to cope. The Tail Suspension Test also measures depression. The animal is suspended by its tail from a metal bar, and its behaviors are scored as either active movement (contortions; swinging; flailing) or immobility. Immobility is considered passive and maladaptive, suggesting depression. These behavioral tests quantitatively measure behaviors in straightforward and objective ways. By studying anxiety and depression in prairie voles and how they cope, we can translate stress responses and coping abilities to humans.

161 Lauren Clohessy

#MeToo Backlash

Author(s): Lauren Clohessy
Department: Sociology
Faculty Mentor(s): Jan Reynolds
Session Time: Session 2

The Me Too movement began over ten years ago in 2006 when founder Tarana Burke coined the term to help women of color who survived sexual violence. The hashtag society is largely familiar with started in October of 2017 when actress Alyssa Milano tweeted for social media users to retweet her tweet with the words “Me Too” if they are a survivor of sexual harassment. Since then, the movement has only continued with more people, specifically women, sharing their stories. The movement was created for victims to stand in solidarity. In response to this show of solidarity, #MeToo has been bombarded with negative responses. I argue that there is backlash surrounding the #MeToo movement on social media. Through qualitative content analysis, I have found three common themes that counter #MeToo: denial through explanation; discounting claims through physical appearance critiques; and threatening to avoid women entirely as a punishment.
Adult coloring has become popular in the last decade. Adult coloring refers to using colored markers or crayons to fill in line drawings which depict abstract or representational designs. Recently, there has been several published studies which indicate that coloring reduces state anxiety. Typically, these studies use pretest posttest designs in which anxiety is measured before and after participants engage in coloring or in some control activity (e.g., solving puzzles). These studies typically show significant drops in anxiety for the coloring versus control conditions. However, these same researchers suggest that demand characteristics may be partially responsible for the findings. The idea is that participants figure out the point of the study because they take a measure of anxiety twice coupled with societal knowledge that coloring is a relaxing activity. Presumably, taking the pretest may cue such demand characteristics. In the present study, we tried to test whether demand characteristics arising from testing effects can account for such findings. We used a Solomon 4-group design to address the hypothesis that anxiety reduction is based on pretest effects. In a Solomon 4-group design, one-half of the participants are given a posttest only design in which there is no pretest, whereas the other half of the participants are given a pretest posttest design in which there is a pretest. If testing effects are present then the posttest results should differ between these two groups of participants. If testing effects are not present, then we should find similar patterns in the two groups.

Going to school can be difficult for any student. With the intense pressure that has been placed upon students by the Trump administration’s deportation agenda, school has become a place of fear and isolation for many immigrant students. Schools have seen a drop in attendance and grades while pediatricians have seen a rise in anxiety and depression in immigrant students. School counselors are facing questions and concerns regarding ICE raids, deportation, and fear of coming to school, many of whom have never dealt with these issues before. Together parents, students, and school counselors have been creating plans and tackling these issues one day at a time to create a safe learning environment for immigrant students.
164  Nadine Kurelo  
*Critical Pedagogy of Education and School Safety Planning*

Author(s): Nadine Kurelo  
Department: Sociology  
Faculty Mentor(s): Diane Rodgers  
Session Time: Session 2

The Columbine Highschool Massacre was the beginning of an emerging trend of school shootings in the United States. There has been a great deal of sociological research discussing why these school shootings may be occurring, as well as other aspects to this topic. An understudied view, coming from the sociology of education, specifically the critical pedagogy of education, concerns the accountability to ensure schools are prepared to protect themselves and their communities. My study examined the wide variability of school safety plans for all fifty states in America and the guidelines for national planning. It appears the education system is allowing a reactive response to these tragic situations versus a coordinated proactive design to ensure cohesion in safety planning exists in our schools. A purposeful, collaborative, values-based change process can lead to a nationwide approach to safety planning for the educational system.

165  Kathryn Blank  
*The Impact of Abortion on the Family Through Comments in News Articles*

Author(s): Kathryn Blank  
Department: Sociology  
Faculty Mentor(s): Janet Reynolds  
Session Time: Session 4

This research aims to uncover how the comments of articles on abortion explain and provide insight into how the public feels about abortion issues and its impact on the family. By examining the comments sections of news articles, we can see the differing views surrounding the topic of abortion and its relation to families and family life. Data was gathered by visiting the websites of news sources and searching through the comments sections of articles about abortion or related issues. Screenshots were then taken of comments and comment threads. These screenshots were then compiled, analyzed, and coded for similar themes across the screenshots. This research is important because it displays real attitudes about the abortion debate from across the political spectrum and how people perceive abortion’s impact on the family.
Studies have shown that people perceive crime as more severe than it actually is. In my study, Perceptions of Fear and Crime on a College Campus, I used survey data to compare the fear that people experience related to crime and victimization and compared the perceived fear to actual risk and victimization of the students. Predictors of fear of crime include gender, race, and location. Women, minorities, and people who are in neighborhoods that are in poor condition tend to have more fear of crime. Crime is always on the minds of individuals, and particularly after the recent increase in violent crime and safety bulletins, there is a need for more research on the perceptions of crime and the perceived fear that people have.

People and the media has had a continued fascination in the supernatural, from books and verbal stories of the past to television and movies today. The supernatural is a fascinating topic and includes paranormal phenomena, like vampires and werewolves, as well as religious supernatural phenomena, like angels and demons. The media uses these supernatural phenomena for entertainment, but there is also a belief in these supernatural phenomena. My study, Supernatural Beliefs and the Media, addresses the various supernatural phenomena that is commonly addressed and through interviews and survey data, I compared beliefs in the supernatural with supernatural media consumption. Since the supernatural is a common theme in the media of today and the media has a large impact on peoples lives, there is a need to see if the media is able to influence the belief in the supernatural.
As part of a larger project looking at healthcare access for undocumented immigrants, this research focuses on healthcare access and provision inside immigrant detention centers. As current administration looks to tighten up immigration policies and increase the number of detainees it is critical to look at the current conditions inside these facilities especially when it pertains to health care access. An increase in numbers however will exacerbate the failings within these facilities. As the number of detainees fluctuates at around 40,000 people a day it is crucial these people have access to quality health care. A number of NGOs have filed grievances against ICE and the detention centers, including the lack of access of health care access and also importantly timely access to this provision. DHS and ICE have both acknowledged that there needs to be improvements, as per the GAO’s (Government Accountability Office) report where found their failure to track and analyze its oversight mechanisms and grievances of detainees. ICE agreed to create a larger task management system for complaints and to also maintain more comprehensive data on complaints. The Obama administration had created some programs for better oversight but were still inadequate, while the Trump administration wants to eliminate these. The lack of access and or delay for these detainees has led to a number of people dying from medical issues that are clearly not only curable but also manageable. This project’s goal is to address the need for not only transparency but accountability from ICE and immigration detention centers as detainees have the right access to healthcare.

An Improv Experience is an ISPAR Grant supported project that aimed to create a new performance medium in which improve jazz musicians and improv actors collaborate in one cohesive form. The rehearsals began for this project in August, and the company meets once a week for a one to two-hour rehearsal. The director and faculty advisor also meet once a week for a check-in, as well as a progress report with the Dean of the College of Visual and Performing arts. This project was born out of the need for collaboration between the schools of the CVPA. By collaborating with the jazz musicians, we opened new channels for networking and also skill building. The communication and teamwork skills that both the actors and the musicians have to utilize are vital to the success of a scene or skit. It has been truly remarkable to see this group of artists working together to create such fun and exciting performances. The company had a three performances in December to complete the ISPAR Grant from the CVPA. Currently, Double Duty is applying to become a student organization where students will have the opportunity to collaborate with other student organizations as well as learn new performance skills. This URAD presentation will complete the Capstone project for director/producer, Leah Harvey.
Abstracts

Community Engagement Showcase

Please Note: All abstracts are printed as submitted by project participants, and are represented in the college of the student’s project.
200  Rosa Perez

Unlock Your Inner Scientist

Author(s): Rosa Perez, Livilla Glover, Alejandra Macias, Mario Salcido
Mentor(s): Sam Watt
Organization: NIU STEM Outreach and the DeKalb Public Library

In partnering with the DeKalb Public Library, our Huskie Service Scholars STEM Outreach team hosted an event titled, Unlock Your Inner Scientist on Saturday March 3, 2018. Children ages 7-12 were able to learn about laboratory safety, biology, and chemistry through interactive science-based activities. The importance of laboratory safety was taught through the use of proper personal protective equipment and teaching the proper laboratory procedures to have fun and stay safe during the experiments. The children participated in DNA Extraction of Spinach and were taught the importance of DNA in biology and the function of DNA. In conjunction with the DNA extraction activity, 3D DNA models were made and allowed the children to understand how information is stored within the DNA molecule in a sequence of nitrogenous chemical bases; Adenine, Thymine, Cytosine, and Guanine or (A, T, C and G). The children extracted their own cheek cells to visualize human DNA and were able to explain why DNA extraction is important in the scientific world. Lastly, the children participated in Inoculation of agar plates with swabs. Rose Bengal agar filled petri dishes were used to grow fungi organisms from items found at the DeKalb Public Library. The purpose of this experiment was to establish the idea of microorganisms surrounding us. Our mission in holding this event was to expose children and their parents to the importance of STEM which allows children to solve problems, gather and evaluate information, and learn about the world surrounding them.

201  Kimberly Escamilla

Increasing the Desire to Read

Author(s): Kimberly Escamilla, Kristen Lookingland, Sherrie Hamilton
Mentor(s): Susan Massey
Organization: Jerry L. Johns Literacy Clinic

Our community engagement project focuses on promoting intrinsic motivation to read and write for children ranging in grades k-5 at the Jerry L. Johns Literacy Clinic. This project focused exclusively on the children being tutored by NIU Service Leaders in the spring semester, to provide a control group for reference. The control group was comprised of the students tutored by NIU Service Leaders in the fall semester. The project included providing the tutors with a new reading interest survey, which aimed to probe further into already developed interests the students may have with regard to the types of themes that appeal to them. The project also included a set of guidelines tutors were to follow which were designated to promote student autonomy and variability of relevant curricula within the 50-minute tutoring sessions. Student progress was monitored on a weekly basis using surveys measuring student contentment, and on a semester basis using reading motivation and interest assessment tools. Research indicates that motivation increases when students have opportunities to make choices about what they learn and when they believe they have some control over their own learning (Rettig & Hendricks, 2000). Supporting the notion that further intrinsic motivation will result in the students
reading more books, the aim of our project is to foster a positive, independent attitude towards reading to increase reading levels. This impacts the community because reading is the gateway to other language, cognitive, and social skills that children are working to acquire in grades k-5 and above.

202  **Sira Crusoe**  
*Conversation Cafe*

**Author(s):** Sira Crusoe, Caprisha Williams, Mia Bonds  
**Mentor(s):** Jocelyn Santana  
**Organization: Office of Academic Diversity, Equity, and Inclusion**

The Office of Academic Diversity, Equity, and Inclusion aims to educate both students and staff on the significance of understanding the cultures and identities represented here at Northern Illinois University (NIU). We realize that the topic of diversity can bring forth feelings of discomfort but, it is essential for our community to have these uncomfortable conversations. Our project, Conversation Cafe is an interactive discussion that helps to promote unity through our uniqueness. The theme for Conversation Cafe is pride and ally ship. Our team chose this topic because we want to break the cycle of negative stereotypes and prejudice thoughts often heard within the spaces of NIU. Instead, our team wants to showcase the positive connections that can manifest when a single conversation breaks down what seems like impossible barriers. Conversation Cafe allows participants to understand their identities and utilize them to benefit those who don’t have a voice in society. We want the NIU community to embrace their differences and share their experiences with others while providing them a safe environment to do so. When Conversation Cafe ends, students leave feeling empowered to make a meaningful change in the way we interact with one another. The goal of this project is to continue spreading awareness on social justice issues by cultivating more discussions both inside of the classroom and outside of the classroom.

203  **Ainsley Galvez**  
*Effects on Peer Interaction through Structured Activities*

**Author(s):** Ainsley Galvez, Alexa Blair, Ashley Walker  
**Mentor(s):** Susana Das Neves  
**Organization: Parent University**

The purpose of this study is to explore the influence of structured activities on social interactions among children participating in Child Interactive Program “CHIP” while their parents attend Universidad Para Padres. We have been working with the children for the past two semesters, and we noted the last of children interaction during the first semester as well as a lack of structure in activities. We often just laid out the games that we had available and watch over them and children chose what they wanted to do. This lack of structure resulted in lack of social interaction among the group; mostly due to the fact that kids who knew each other from other social spaces chose to stay with their peers. The unique challenge is the age of children ranging between 3 to 17 years old. During our second semester, “CHIP” facilitators received training on Coordinated Approach to Child Health “CATCH” and 4-H Latino Club from Northwestern Medicine and Illinois Extension programs, respectively. However, through the CATCH and
4-H certifications, we were able to develop a curriculum that is inclusive regardless of age and ability. Collection of data was conducted mainly through observation and a survey to further explore the types of interaction kids had with their peers before and after structured activities.

204  Nicholas Newman  
*Friends of the Garden*

Author(s): Nicholas Newman, Danielle Newman, Adekoyejo Adegbenro, William Graham  
Mentor(s): Melissa Burlingame, Melissa Burlingame, Michaela Holtz  
Organization: NIU Communiversity Gardens

The NIU Communiversity Gardens (NIUCG) is a community service organization that is an affiliate of the DeKalb County Community Gardens (DCCG) and operates several locations on the NIU campus. Located at Anderson Hall, the primary NIUCG site is starting the fifth growing seasons. As a whole, the NIUCG works to engage the DeKalb and NIU community to alleviate food insecurity issues, and to educate students and community members on gardening principles, sustainability, and food security issues. Each semester, three unpaid interns serve with the Communiversity Gardens to meet these goals. In 2017 and 2018, the work done by the NIUCG interns has been focused on facilitating more community interaction and exposure on social media through a variety of initiatives. In the fall of 2017, the interns started the “Friends of the Gardens” meetings as a means to develop more direct relationships with volunteers and students interested in the NIUCG by organizing student-led meetings to improve volunteer coordination, plan future initiatives, and increase participation. The NIUCG interns have also increased emphasis on social media outreach by advertising for more fundraisers and garden events than ever before. They have also worked to encourage more consistent participation with students and community members by compiling a master contact list of NIUCG volunteers and planning a stronger efforts to organize volunteering by using Sign-Up-Genius as a way to better facilitate efficient engagement in events, fundraisers, and general volunteering opportunities.

205  Vanessa Saldana  
*The Perspectives and Probabilities of Future Northern Illinois University Students*

Author(s): Vanessa Saldana, Emma Ruiz, Felipe Dominguez  
Mentor(s): Angelica Mendoza  
Organization: Latino Resource Center

Working with the Latino Resource Center supervised by Angelica Mendoza. Our Project is focused on experiences of prospective students thru the campus visits hosted by the Latino Resource Center and how these visits have impacted them and us. This project is important because it will allow us to gain insight into ways to improve these visits and encourage prospective students to join the Northern Illinois University community.
The Sustainability Tracking, Assessment & Rating System™ (STARS®) is a transparent, self-reporting framework for colleges and universities to measure sustainability performance. It is hosted by the Association for the Advancement of Sustainability in Higher Education (AASHE), the leading community for sustainability resources in higher education. The NIU Green Team, Environmental Studies Department, and Sustainability Intern are documenting sustainability practices at NIU for the AASHE STARS program in order to gain recognition for ongoing green initiatives, improve campus engagement in sustainability, and track progress toward becoming a greener institution. This initial process has already led to increased inter-departmental collaboration and campus engagement in support of a more sustainable NIU; the offices of Campus Dining, Orientation, and Employee Wellness have started working with the NIU Green Team to integrate sustainable practices or environmental outreach among their offerings. Gaining AASHE reporter status will provide better awareness - both on and off campus - of the ongoing green practices, policies, and goals currently pursued by NIU. The STARS tracking capabilities provide NIU with a useful tool to track progress and continually incorporate sustainability into ongoing practices. Ultimately, the results of this project will enhance campus engagement, recruitment, and retention by improving NIU’s reputation as an environmentally sustainable institution.

The NIU student service leaders at Sycamore High School decided to do a project focused on students in the Forum Room. The Forum Room is a room dedicated to helping students with IEP’s in any way possible. The students in this room expressed that they were seeking employment opportunities, but some were confused how to go about it. Over the course of three weeks we gave the class 5-10 minute presentations on resume tips, what to be careful with when filling out a job application, and interview skills. Before the first presentation we handed out an open-ended question sheet. Each presentation we began by talking about the sheets and what the students learned. The goal of this project was to teach students valuable knowledge about resumes, job applications, and interview skills. This project benefited most of the students in the forum classroom and it should continue because the goal was met.
The purpose of our service learning project this year is to come up with innovative methods that would allow volunteers from the Huskie Food Pantry throughout the school year and/or semester help all while having some background knowledge of the pantry itself. Within the last semester, my fellow, Nandini and I have volunteered at the Huskie Food Pantry by either restocking merchandise, bagging supplies or calling out ticket numbers for the students to come and shop. We noticed that throughout the semester, schedules began to get busy or change, and our volunteers from the beginning of the semester were not the same ones that we had towards the end of the semester. With that, we took into consideration some training techniques that the Huskie Food Pantry will put in place in the near future in order to ensure that all volunteers follow the same steps and can learn quickly and effectively how to work the pantry without taking time away from the act of volunteering itself and having to explain the regulations in different ways by different people. With these training techniques, we will show old and new volunteers how to properly clean out fridges when needed, how to properly restock merchandise and read expiration/best by labels properly in order to help shoppers shop more efficiently and make their experience overall easier. Through these methods, we have come up with ways to help the pantry have the same training techniques running throughout the school year all while welcoming new volunteers to join since the learning process will be all the more easier!

We have conducted a semester long survey about Hungry Huskies. Hungry Huskies is a Sunday dinner program ran by the Wesley Foundation. They provide a safe place and dinner for students, staff, and any community member. Dinner is free every Sunday night. There are various reasons why people attend this Sunday night event. Our project was to figure why, and how we as students can help fight food insecurity in the NIU community. We are giving credit to Hungry Huskies for being so impactful to those who come every Sunday. We can see the difference it makes providing a free hot meal. We also volunteer our help at Hungry Huskie by setting up tables, serving food, and cleaning up after the dinner.
The Huskie Food Pantry is a source of nutritional food, experiential learning and service for the NIU community. As a non-profit organization, we rely on the support of our generous donors, volunteers, interns and university partners. Our vision is to serve an NIU student population focused on their education and not challenged by their food insecurity. We provide supplemental support to currently enrolled NIU students without a meal plan who are experiencing food insecurity at no cost to the student. We employ strategies to create a welcoming and inclusive environment in which students can gather the resources needed to alleviate hunger, make healthy food choices and focus more on academic success than meeting their basic needs. We are committed to providing students with experiential learning opportunities which will prepare them for student career success. In this endeavor, we strive to facilitate community to provide these resources and opportunities to NIU students in an environmentally and fiscally sustainable manner.

The Environmental Resource Center (ERC) is a subset of the Institute for study of the Environment, Energy and Sustainability. The ERC aims to educate the DeKalb community, students, and faculty on environmental issues and assist in the implementation of individual environmental projects. The ERC is meant to act as a catalog of information for the community, containing many of the local DeKalb ordinances pertinent to environmental issues as well as information on a broad spectrum of environmental and sustainability projects. In developing the ERC, we surveyed members of the community to see what areas of environmental interest people commonly search for. We defined the categories of main interest that we then began populating with information. We then compiled this information into a database whose aim is to reach the NIU population, DeKalb residents, and the greater Northern Illinois area in hopes of increasing the implementation of personal environmental projects and initiatives.
212 Amor Taylor  
*Roadblocks to Biliteracy: Promoting bilingualism*

Author(s): Amor Taylor  
Mentor(s): James Cohen, John Evar Strid

This presentation is based on the study that I worked on with 2 of my professors as well as two other students to discover some of the roadblocks hindering students from keeping their heritage language. Our study was presented over a total of 3 conferences directed towards helping to minimize these roadblocks and promote keeping students heritage language.

213 Ivy Cirar  
*Aeroponics as an educational tool for combating food insecurity*

Author(s): Ivy Cirar  
Mentor(s): Gary Swick  
Organization: NIU Institute for the Study of the Environment, Sustainability and Energy

The cycle of food insecurity leads young people to believe that they will grow up to be victims of our flawed food system like their parents. Oftentimes they do. Food deserts exist in our own communities, including that of NIU. While changing our entire food system to serve all communities is the ideal, it is a huge task. A more realistic approach is to teach people, particularly the youth, about food autonomy. By empowering each individual to take their food security into their own hands, we can decrease the number of people that go hungry on a regular basis. The project I am working on is an aeroponic gardening system. It consists of two vertical towers with room for up to 20 plants on each. An aeroponic system can be an interdisciplinary teaching tool, potentially for use in lessons about food security, plant biology, agriculture, and sustainability. It provides an opportunity for year-round, hands-on learning which can increase student interest and retention of information. It is also appropriate for any level of education from elementary school to postsecondary courses. The garden can be moved indoors or outdoors and is low maintenance compared to a garden plot. Small scale aeroponic garden projects like this can impact communities by teaching students how to grow food and encouraging them to be proactive in obtaining affordable produce. Growing one’s own food provides a sense of accomplishment and a healthier lifestyle overall. On a large scale, these effects can be seen throughout an entire community.
STEMfest celebrates innovations in science, technology, engineering, and mathematics (STEM). Northern Illinois University STEM departments, student groups, regional corporations, museums, educators, and national labs join forces to present hundreds of hands-on activities that range in complexity to engage people of all ages. The purpose of STEMfest is to increase awareness of the critical role science and other STEM fields play in our world every day. To orchestrate an event such as STEMfest has exponential benefits for the community. STEMfest 2017 at Northern Illinois University focused on bringing together partners from the University and throughout the region to increase educational success for students and families. This event is important because STEMfest fosters innovation in schools and communities through hands-on activities for kids, educators and families as well as regional networking to improve college and career readiness. BLOCK Fest is a program within the Center for P-20 Engagement, which helps to introduce math concepts to children from 8 months to eight years old. The BLOCK Fest station included five block play stations to introduce children and their parents to the educational value of blocks. BLOCK Fest educated participants about the short and long-term importance of early math and science learning. Therefore, having more events like STEMFest is beneficial to any community.

This course entails partnering with clients to identify business problems, develop viable solutions, and present recommendations to be implemented. At the end of the semester, we will learn consulting methodologies while examining the strategic aspects of social enterprises learned in class. The focus of the class is to identify social needs in the global community, recognize social innovation opportunities, design strategic business models for social enterprises, and develop plans for strategic implementation.
Upon spending time at our site, Clinton Rosette Middle School, we noticed the group of students we were working with had many behavior related issues. The students were acting up, constantly getting in trouble, and disrespecting each other as well as their teachers. In attempt to reach these kids and open their eyes to their actions Felix and I decided to conduct a group discussion with the students. We centered around the topic of bullying and aimed to create an environment where the students felt free to express their thoughts. We had a very interactive, well conducted discussion and knew we made an impact when we overheard several students apologizing to one another about their behaviors.

Wild foraging is a recent area which has recently begun to gain popularity. The act of foraging is an art that allows people to experience new areas, become interested in native edible plants, and connect with other students. The focus of this project is to collect data on foraging locations with plant types for a new layer for use on the interactive Northern Illinois University map. This map would serve as a resource for students and faculty to use in locating foraging areas on campus. GPS coordinates would be plotted on the map and foraging locations would be accessible like geocaching. Foraging would provide students with an opportunity to learn and identify edible plants, and promote exercise and a healthy lifestyle. With the addition of this resource, interest in foraging may increase along with the potential to connect with and inspire the surrounding community. For this project, I will use guidebooks for identification, collaboration with organizations in finding foraging areas, and the start of a map will be conducted using GIS technology.
Abstracts

Exhibits

Please Note: All abstracts are printed as submitted by project participants, and are represented in the college of the student’s project.
300 **Maverick Wojciechowski**  
*Electric Shifter*

**Author(s):** Maverick Wojciechowski, Roberto Garcia, Ricardo Reyes  
**Department:** Electrical Engineering  
**Faculty Mentor(s):** Danald Zinger  
**Session Time:** Session 1

This work is a project for a niche group of people wanting to optimize their performance in the racing division of motorcycle engines. The team researched the best method for automatically shifting the manual motorcycle transmission for optimal results compared to the average driver, this allows the team to have better results during races than if they were to be manually shifting the car while maneuvering around the track. The solution had to fit within size, weight, and power limitations while being at a price point at which it is convenient for the team to afford to buy instead allocating more time to train their drivers. The solution is composed of all electrical components allowing it to be lightweight and fast without taking up much room compared to comparable products that have been made in the past. This has been achieved by a small Electrical Engineering Team; Roberto Garcia, Ricky Reyes, and Maverick Wojciechowski. The project imposed not just Electrical requirements but also Mechanical problems to solve incorporating many sides engineering, this allowed the members to use an outside look of how a mechanism might work and developed a version that seems to have much better results than others created in the past.

301 **Goda Inokaityte**  
*Digital Die*

**Author(s):** Goda Inokaityte, Brendon Mills  
**Department:** Electrical Engineering  
**Faculty Mentor(s):** Reza Hashemian  
**Session Time:** Session 4

This project aims to modernize the traditional six sided die. It allows for variance in the range of outputs while utilizing quantum effects to create a truly random number.

302 **Oscar Mendoza**  
*Portable Solar Siphoning Power Bank (P.S.S.P.B.)*

**Author(s):** Oscar Mendoza, Zackary Sedivy, Nicholas Aguinaga, Joe Dawson, Ronald Paraham  
**Department:** Electrical Engineering  
**Faculty Mentor(s):** Donald Zinger  
**Session Time:** Session 2

There is a time in everyone’s life where they might be out doing either errands, taking a trip, or going camping and then suddenly they check their phone and it’s of the verge of dying with only a couple percentage left. That momentary fear sets in of what are they going to do and that’s when they notice
you have a charging cable, wall outlet plug, and a drained power bank. That’s when they remembered that power bank can acquire more power from solar power. After setting it up they realize their phone battery is going to die before enough charge can build up in the battery. That’s when they notice their friend still has plenty of charge and are able to get back up to a reasonable percentage to last until they can get to a power outlet or the solar panels have charged the power bank backup to a usable percentage.

The above is just one scenario where someone was still able to charge their phone even with lack to almost anything beside the portable power bank we are in the process of constructing. We want to achieve a portable power bank that is small enough for most pockets, can produce power thanks to solar panels, and to have it be able to siphon power from any cellular device to either store or transfer immediately to another device. We are going to do this by having 4 solar panels connected to the power bank that can collapse onto the bank in an accordion style and latch shut. The other aspect is the siphoning functionality which by the end we want to be able to siphon and supply power to any phone. The siphoning function will have an LED to inform the user that it is actually working and siphoning power from the donor phone. The other nice aspect to this power bank is that it will give a digital readout of the remaining percentage of power in the power bank to make it easier for users to know when they might need to recharge the power bank.

303  Alex Starkey

Routing Optimization of Incoming and Outgoing Packages

Author(s): Alex Starkey, Elizabeth Wilson, Dulce Galindo
Department: Industrial and Systems Engineering
Faculty Mentor(s): Purushothaman Damodaran, Christine Nguyen
Session Time: Session 1

The shipping and receiving (S&R) department at Woodward handles hundreds of work-in-progress (WIP) kits and packages daily from both external and internal sources which regularly need to be delivered across their facility. Currently, the material handling operation consists of staff in the S&R department known as truckers, who are responsible for the movement of all incoming, WIP, and outgoing material onto carts and delivering them to racks according to the work orders. There are over 70 labeled racks and an unknown amount of unlabeled racks scattered throughout the facility. The truckers move material at their own leisure because there is currently no schedule for them to follow. This creates a waste of resources across the facility and increases lead times as material waits for further processing. The objectives of this project are to establish standard work for the procedure of material handling, identify the best route for the truckers to take, and create a daily schedule for trucker deliveries. In addition, optimizing the overall number and locations of racks will minimize the distance truckers have to travel while establishing time standards for both the trucker and material flow. Visually redesigning the racks will decrease delivery mistakes and improve communication among all parties involved. By establishing standards and improving the ergonomics of the operations, the improvements will yield a decrease in lead time; saving time, space, and money while lowering variation of material handling and employee fatigue.
HydraForce is a large designer and manufacturer of the valves, manifolds, and electro-hydraulic controls. In this project, we will be exploring the inspection process that the manifolds undergo before they are released to the consumers. The inspection process consists of a visual inspection and then a tool assisted check of a bore’s width, depth, thread, pitch, chamfer, and concentricity. Currently, the process has a lot waste due to workers walking to retrieve tools. With a consolidation process occurring and the movement of their current three buildings into a singular facility, HydraForce is taking the opportunity to reduce the amount of waste produced during the inspection process. The primary tools utilized to measure the effectiveness of the layout alterations were a spaghetti diagram, a value stream map, and arena simulation. The factors that were focused on to reduce the overall process lead time was transportation time between stations as well as a tertiary focus upon tool availability for the inspection processes. The workers are divided into two-person cells to effectively manage tool availability while keeping the total cost of tool purchasing to a minimum. Along with this, the new suggested layout utilizes less overall space and thus reduces worker changeover times originating from less time spent on manifold and tool retrieval. With this reduction in changeover time, a large contributor to waste will be minimized and allow for a more efficient process flow.

Plotty is a whiteboard transcription device that will allow its user to sit at a desk and still be able to communicate effectively in a lecture hall. Plotty’s goal is to transfer what is written on any computer or tablet onto the whiteboard. Working on Plotty, we want to make it as simple to use for the teacher or instructor, as well as unobstructive as much for the students or listeners. Plotty will be able to support multiple colors to improve the teaching capabilities of the instructor. Our goal is to open up the whiteboard to any teacher regardless of their ability to write on a white board.
309  Adam Jansen

LED Street Light

Author(s): Adam Jansen
Department: Mechanical Engineering
Faculty Mentor(s): Federico Sciammarella
Session Time: Session 2

A 2014 study by the U.S. Department of Energy found that LEDs were used for 10% of exterior lighting applications. While that number continues to grow because of the well documented energy and cost efficiency of LED technology, complaints from residents and some environmental studies have exposed photobiological drawbacks. Our street light fixture is designed with a holistic approach to minimize the negative aspects of LED lighting while retaining the intrinsic cost saving energy efficiency. The design strategy relies on secondary optics, designed and manufactured by LEDiL INC., to manipulate the natural LED light distribution.

310  Ivan Sanchez

Exploration of Virtual Reality in Modern Teaching

Author(s): Ivan Sanchez
Department: Computer Science
Faculty Mentor(s): Michael Papka
Session Time: Session 4

The purpose of this research is to explore the potential of virtual reality. In this project, the research will discover the impact virtual reality can have preparing future teachers. This research will specifically look to prepare Kinesiology students and provide a new approach to teaching that can greatly immerse the student and provide a more efficient way to learn. We expect the research to yield a new approach to learning with virtual reality as an immersion tool.
Abstracts
Sycamore High School

Please Note: All abstracts are printed as submitted by project participants, and are represented in the college of the student’s project.
The effects of Point Source Pollution on Nitrate, pH, Conductivity, and Dissolved Oxygen

Author(s): Adam Cyr
Faculty Mentor(s):
Session Time: Session 2

The EPA defines point source pollution as a “single, identifiable source of pollution” (Point and nonpoint). These sources include pipes, drains, or even something as big as a wastewater treatment plants. This study looked into possible point sources of pollution and the effects they have on the chemicals in the water at various locations within the East Branch of the South Branch of the Kishwaukee River (EBSB) sub-watershed. Morrison (2001) conducted the same type of research on a water treatment plant in Africa and found that chemical concentrations were higher after the treatment plant than they were before. Four possible sources of pollution were identified within the EBSB sub-watershed. Water samples were taken upstream and downstream from the source. Variations in water quality before and after the sites were limited. Nitrates, before the source, were high at 18 mg/L and between 15-18 mg/L after the source. Conductivity, pH, and dissolved oxygen before and after the sites remained in their recommended ranges. From these data points, we were able to conclude that the point sources of pollution studied did not affect the Kishwaukee River (EBSB) sub-watershed to a great extent.

Comparison of Fish Assemblages to QHEI Scores in the East Branch of the South Branch of the Kishwaukee River

Author(s): Ben Gehant
Faculty Mentor(s): David Kousoulas
Session Time: Session 2

Freshwater fish are essential to the health and survival of local freshwater environments. Fish play a vital role in nutrient cycles since they store nutrients in their tissues that are extremely important to the ecosystem. In addition to this, freshwater fish excrete nutrients that are then available to primary producers (Oberdorff 2002). The focus of this study concerned determining the diversity and abundance of fish species in the East Branch of the South Branch of the Kishwaukee River (EBSB) sub-watershed and relating those findings to the qualitative habitat evaluation index (QHEI) of each site. Four sites were surveyed within the EBSB sub-watershed. Three trials were performed at each site, where a seine was used to collect the fish. It was found that there is a relationship between the QHEI and the diversity of fish that are present in each of the locations. With the exception of one site (Virgil Ditch Three) the data demonstrated that there is a predominance of certain fish such as Luxiouous corniutus, that comes along with less diversity. The results, despite the restrictions of the study, suggest that there is a relationship between the QHEI of streams and the diversity and abundance of fish that are present. An addition to this study would include a more advanced method of sampling, such as electroshock fishing, to better be able to properly record the species that are present in each site.
Grace Gruner

The Presence and Prevention of Erosion in the Local Kishwaukee River Watershed

Author(s): Grace Gruner
Faculty Mentor(s): Maria Wright
Session Time: Session 2

The intention for this study is largely to identify how erosion affects the chemical and physical properties of the Kishwaukee River Watershed and to determine how to restore watersheds that need protection. This research makes use of Qualitative Habitat Evaluation Indexes, tools to record chemical levels, and other devices to track the influence of certain factors on water chemistry. To label a stream healthy or unhealthy, the research takes periodic samples of pH, water temperature, dissolved oxygen, and other chemicals and gives the stream a numbered score on a QHEI. The articles that are being reviewed include studies on the effect of environmental factors like geology on water chemistry, the processes that lead to soil losses in watersheds, the effect of land use on streams, and techniques for erosion control. The purpose for researching this topic is to recognize the effect of human activity on the degradation of local watersheds and suggest a solution to better preserve and improve the river conditions.

Elliott Marsh

How Seasonal Change Effects Chemical Levels in the Kishwaukee River Watershed

Author(s): Elliott Marsh
Faculty Mentor(s):
Session Time: Session 2

Nitrogen fertilizers are used to increase crop yields. Excess can migrate to streams in the form of nitrates. Water samples were collected at 8 different sites in the East Branch of the South Branch of the Kishwaukee River watershed to see if there is any variation due to agricultural runoff. The sites included six man-made agricultural ditches and two locations on the Kishwaukee River itself. The Kishwaukee River watershed is the main water system in DeKalb County. It also runs into Kane County. Chemicals analyzed during this time included: nitrate, nitrite, phosphate, and pH.

Sophia McComb

A Comparison of Substrate Preferences for Native and Invasive Mussel Populations in the Kishwaukee River

Author(s): Sophia McComb
Faculty Mentor(s): Madeline McCormick
Session Time: Session 2

Freshwater mussels (family Unionidae) are particularly important for the preservation of local freshwater aquatic habitats and environments. Of increasing priority is examining the relationship between the growing population of non-native C. fluminea and the survival of the species in aquatic
environments, as well as the discovery of any substrate preferences. Many of the articles reviewed indicate that the scientific community studying freshwater mussels has paid great attention to the latter, but very few studies focus on a relationship between non-native C. fluminea and native mussel populations. Two sites were surveyed within the East Branch of the South Branch of the Kishwaukee River sub-watershed. A total of 64 randomly selected quadrats were surveyed for substrate composition, native mussel species, and non-native mussel populations. Significant correlations were found between both native and non-native populations to the percentage of sand in the substrate, as well as a strong positive correlation between C. fluminea populations and the presence of native species. Important in the consideration of these results is the late period of survey in the freshwater mussel activity season, and the relatively small sample size of the study. The results, with consideration to the limitations of the study, suggest the dominance and strong adaptive ability of Corbicula (Sousa, et al. 2009). This also presents a need for further examination of the relationships between native and non-native species, and the containment of invasive population growth.
Event Staff (Office of Student Engagement and Experiential Learning):

Grace Anati
Iva Andonovska Wigget
Randall Barnes
Erica Barron
Mia Bonds
Anetia Dickens
Oriana Flores
Johnathan Freeman
Nelisha Gray
Anthony Guzzaldo
Michaela Holtz
Jazila Hussain
Zachary Kalk
Renique Kersh
Alexia Kingzette
Ashley Kyle
Patty Lee
Edgar Lopez
Destiny McDonald
Emili Mikolajczyk
Yosue Perez
Vanessa Saldana
Vivian Smith
Aspen Wheeler

URAD and CES Assistance:

Liz Wright, Office of the President
Joan Parrish, Office of the Provost
Jeanne Baxter, NIU Alumni Association
Mike Strunk, Holmes Student Center
Nick Meyers, Holmes Student Center
Abby Lund, Office of the Vice Provost
Taylor Hayden, Division of Enrollment Management, Marketing and Communications
Sophia Varcados, Division of Enrollment Management, Marketing and Communications
Document and Print Management, Division of Information Technology
Student Engagement Ambassadors

Event Volunteers

Georgia Breunig
Felipe Dominguez
Katie Granger
Passion Holliman
Julia Martinez
Yesenia Mercado
Kaylee Rosenberger
Angie Rodriguez
Ashley Terrell
Rebecca Viereckl